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A COMMUNITY SURVEY OF HELICOPTER NOISE ANNOYANCE CONDUCTED UNDER CONTROLLED NOISE EXPOSURE CONDITIONS

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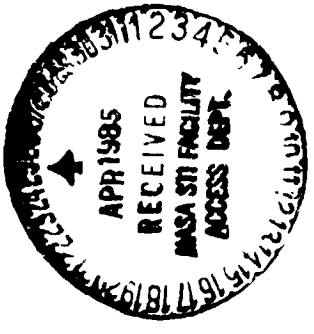

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SUMMARY

Increased helicopter usage in urban areas has led to requests for information about responses to helicopter noise when there are low numbers of noise events. A new type of survey was designed to provide information about responses in these little-studied situations. A community which was normally exposed to helicopter noise was selected. On 17 study days the numbers of helicopter operations and the noise levels from those operations were controlled so as to meet the needs for an efficient study design. Some 338 community residents were interviewed about reactions to the helicopter noise on each of the days when the helicopter operations were controlled. Respondents were asked about a 9-hour study day (0800-1700) thus no information was collected about nighttime reactions. Noise levels were measured on all study days. Analyses of follow-up interviews show that respondents were unaware of the purpose of the study.

The results from the survey are consistent with the equivalent energy assumptions which are implicit in such average noise level indices as LEQ (Equivalent Continuous Sound Level) or LDN (Day-Night Average Sound Level). Reactions are represented as well or better by a logarithmic transformation of the number of events than by a simple linear representation of the number of events. The data are consistent with the representation of duration which is implicit in equivalent energy assumptions. The relative effect of noise level and number of events is consistent with that in the equivalent energy model.

Reactions to sounds from helicopters appear to be approximately equally well accounted for by SEL (Sound Exposure Level) and EPNL (Effective Perceived Noise Level). The reactions to relatively impulsive and non-impulsive helicopters are found to be approximately equivalent when duration is taken into account in noise indices. Reactions to helicopter noise increase steadily above 45 dB (LEQ, 9-hour).

This new type of study design was able to produce estimates of parameters in a human reaction model which could not have been as economically obtained, if at all, from a conventional survey or laboratory study. The estimates are less precise than is desirable. An important source of imprecision is day-to-day variation in reactions which can not be explained by noise level. Reactions to daily noise levels measured with repeated interviews resemble reactions to long-term noise levels as measured in conventional surveys in respect to sensitivity to noise level, the weak effects of demographic variables and the importance of attitudinal variables. Some of the evidence suggests that annoyance with aircraft noise is affected by the length of the study period. This effect did not interfere with the achievement of this particular study's goals.

INTRODUCTION

Increased helicopter usage and a demand for more heliports in urban areas has led to requests for uniform guidelines for land-use planning purposes and helicopter operating procedures. For conventional aircraft operations such guidelines are often based on the extensively studied and widely accepted average energy noise indices such as LEQ (continuous equivalent sound level) or LDN (day-night sound level). The applicability of such indices for operations around heliports in the United States is uncertain because most heliports have quite low numbers of daily operations, usually less than 50 a day. A major issue concerning community response when there are such low numbers of noise events is the applicability of the equivalent energy assumptions about the relative importance of noise level and number of noise events. The research described in this report was thus designed to investigate the reactions of community residents to noise from low numbers of helicopter operations.

It was not feasible to use conventional survey techniques to study reactions to low numbers of helicopter flights. A conventional social survey of residents' long-term reactions to naturally occuring helicopter noise environments was rejected for two reasons: (1) satisfactory combinations of numbers and noise levels of helicopter flights could not be identified in existing communities and (2) an economical noise measurement program could not provide a satisfactory estimate of the long-term noise level because of the daily variations in noise levels and the typically unscheduled nature of the operations. A laboratory study was rejected because the small number of flights (as few as 2 in 9 hours) could not be realistically rated. The final design combined features found in both laboratory and field studies: community residents were interviewed but helicopter operations were, unknown to the residents, standardized for easy measurement during the study period.

Important aspects of the innovative study design are discussed in the first two major sections of this report before moving to a discussion of the main results. In the first major section, the planned study design and data collection procedures are presented. The designs of the noise exposure plan and the social survey sample are described. The four phases of the social survey interviewing process are discussed. The noise measurement program is described as well as the methods for converting the standard noise measurements into individualized 9-hour exposure indices for each respondent.

The second major section draws on the data collected in the survey to describe the study area and the actually measured helicopter noise environments. Information about the community setting and the normal noise environment is presented. The respondents' demographic and attitudinal characteristics are presented along with information about their perceptions of the survey process. The helicopter noise environments which were actually measured during the 17 controlled exposure days are described.

The survey results are discussed in the remainder of the report. Three major topics in the evaluation of helicopter noise are discussed: the relative effect of noise level and number of noise events, the effect

of helicopter type and the relative predictive power of different noise indices. Several methodological issues involved in measuring annoyance with noise are explored with this survey's data. Finally, a more complete understanding of the annoyance response is provided through an analysis of the effects of both personal characteristics and study design characteristics on annoyance responses.

SYMBOLS AND ABBREVIATIONS

More details for indices and scales for acoustical measurements can be found in general noise references (e.g., Bennett and Pearsons, 1981).

A	Annoyance with noise
B	Partial regression coefficient (not standardized)
B_0	Intercept for regression equation
D_{LEQ}	Difference between the values of LEQ for two types of helicopters on a single day, dB
EPNL	Effective Perceived Noise Level, dB
k	The decibel equivalent of the effect that a variable has on annoyance (defined by the ratio of the partial regression coefficient for the particular variable to the partial regression coefficient for noise level)
L	Sound Level, dB
LA	Maximum A-weighted Sound Level, dB
LDN	Day-Night Average Sound Level, dB
LEQ	Equivalent Continuous Sound Level, dB
PNL	Perceived Noise Level, dB
SEL	Sound Exposure Level, dB

Subscripts

F	Fixed noise measurement position
H	Helicopter type
Imp	Impulsive type helicopter (UH-1H)
M	Mobile noise measurement position
N	Number of helicopter noise events
Non	Non-impulsive type helicopter (UH-60A)

STUDY DESIGN AND DATA COLLECTION PROCEDURES

Overview

The study was conducted in a suburban section of Newport News, Virginia, which is normally exposed to helicopter flights from Fort Eustis, a major U.S. Army transportation center. The noise exposure was controlled during 17 study days by scheduling flights over a fixed flight path between 8 a.m. and 5 p.m. The sample consists of residents who are normally home during the day and who live within a 500m corridor under the study flight path. The initial interview was conducted in person before the controlled flights began but the remaining 22 repeated interviews were conducted by telephone in evenings following 17 controlled helicopter noise exposure days and five other days. Analyses of response to noise are based on only the 17 controlled exposure days. The other 5 interview days were included for methodological purposes. Each study day is described in tables in appendix A. Three noise measurement teams measured the noise from helicopter flights on all controlled exposure days.

Helicopter Noise Exposure Plan

The helicopter noise exposure was controlled on the 17 controlled exposure days by routing specific types of flights from Fort Eustis over the study area and by rerouting other helicopter flights away from the study area. Local air traffic control officials tried to keep all other flights at least one mile from the study area. The map in figure 1 shows the flight path which goes through the middle of the rectangular study area. The flight path was chosen for easy identification from the air: much of the path follows a central straight road which is in line with a distant water reservoir. Most flights proceeded in a northerly direction, as indicated by the arrow on the map, but some came in the reverse direction. Almost all of the controlled exposure flights were provided by rerouting flights on-route to or on return from routine training exercises. The center of standard Fort Eustis helicopter operations is labeled "HELIPORT" in the upper left corner of the map in figure 1.

The exposure condition for each of the study days was designed to provide a particular type of helicopter noise exposure. The number of study days planned for each type of noise exposure condition is presented in table I. The study was designed to manipulate the three variables in table I: noise level, number of flights per day, and helicopter type. The two maximum A-weighted noise levels, (85 dB and 75 dB) are based on two altitudes (500 ft. and 1500 ft.). The numbers of flights are the number of flights scheduled on the flight path between 8 a.m. and 5 p.m. Two helicopter types are included: the relatively impulsive UH-1H ("Huey") and the less impulsive UH-60A ("Blackhawk") (fig. 2). Large numbers of UH-60A helicopters could not be obtained and thus in table I the flights on high number-of-event days are of UH-1H helicopters. Table I contains 18 exposure conditions, however only 17 controlled exposure days were actually achieved due to a flight scheduling problem on the last study day.

The various types of exposure days were intermixed over the study period except that the two highest number-of-event days were scheduled for the last two weeks so that if publicity were generated by the highest noise exposure conditions, it would not bias the previous interview responses. Controlled exposure days and in fact all 22 study days were weekdays, Monday through Thursday. Flights tended to be concentrated in the late morning and early afternoon. The actually achieved helicopter noise environments are presented in tables A-II and A-III in Appendix A.

Sample Selection

The study area enclosed by a 500 m strip along the approximately 6 km long flight path (fig. 1) includes 861 dwellings. The study area is a suburban residential area (fig. 3). No commercial establishments are enclosed in the area. All dwellings are either one or two story frame construction dwellings. The study area is bounded on the north, west and south by rivers which are not crossed by roads. As a result there is only local traffic and no major roads are included in the area.

The study population is defined to be all adults residing within the study area who are normally at home during the daytime on weekdays. An attempt was made to include every eligible member of the population in the sample with the single exception that no more than one person was drawn from each household.

The sample was drawn by first creating a list of all addresses by up-dating a map of the area during an address listing visit. Before interviewers visited the area for sample selection, letters were sent to all 861 dwellings asking for the residents' cooperation in the study (appendix B). Interviewers used the "Respondent Selection Sheet" (appendix B) to determine whether each resident met five eligibility criteria: (1) at least 18 years of age, (2) usually at home during the daytime on weekdays (at the very least on two of the Monday to Thursday weekday mornings), (3) expect to be home for the following five weeks, (4) not a night worker (i.e., awake during the day) and (5) normal hearing (no difficulty in hearing normal conversation). One individual was randomly drawn from among any eligible adults in a household. At the end of the initial face-to-face interview, the respondent was told about the telephone follow-up program and was given a 40-dollar honorarium for agreeing to participate.

Of the 861 dwellings in the area about half had eligible adults from which the final 338 respondents were drawn with a response rate of 84%. Of the 338 respondents, 330 completed the program and yielded a concluding interview thus giving an attrition rate of 2%. More details on these response and attrition rates are provided in appendix C. With 338 respondents and 22 follow-up days there were a possible 7436 follow-up interviews from which a total of 6345 interviews were conducted with respondents who had been at home at least part of the 8 a.m. to 5 p.m. period on that day. Thus 85% of the attempted follow-up contacts yielded usable interviews.

In the analyses which relate the respondents' annoyance to measured helicopter noise exposure levels, only the interviews from the 17

noise exposure days are included. A total of 4880 interviews were conducted when people were at home during controlled helicopter noise exposure days. From an examination of these respondents' activity patterns it was determined that 4178 interviews were conducted with individuals who were at home during at least one of the scheduled helicopter noise events. Most of the analyses of response to helicopter noise are based on these 4178 interviews.

Social Survey Data Collection

The social survey questionnaire development and data collection process consisted of four distinct phases. Special steps were taken to maintain a high quality of data collection during the extended study period.

Questionnaire Development Phase (June to August, 1983). - The questionnaires were developed in accord with standard noise annoyance survey procedures. The questionnaires are quite short and consist largely of types of questions which have been thoroughly tested in other noise annoyance surveys. Some development was, however, needed on two types of questionnaire items: the time diary questions (Q.1 in the repeated telephone questionnaire in appendix B) and a scale labeling question (Q.11 in the initial face-to-face questionnaire in appendix B). Pretests served to test these questions and, more importantly, to test the procedures needed for recruiting and maintaining the sample for the large number of repeated interviews.

A small-scale pretest of 10 interviews was performed around a commercial airport in June. Two larger pretests with 18 people and 14 follow-up interviews each were performed around a large conventional military airport in July and August. As a result of these two pretests, it was concluded that 40% of the addresses would yield interviews, that a high continuation rate could be expected, that respondents would be willing to cooperate for a long series of repeated interviews and that interviewer assignments could be smoothly rotated during the follow-up program. It was also decided that it was essential that all the repeated telephone interviews be made from a single, closely supervised central location.

Face-to-face initial interview phase (August 30 to Sept. 13).- The initial face-to-face interview was conducted in the respondent's home. The visits to addresses in the study area were preceeded by the previously mentioned letter to respondents (appendix B). After the respondent was selected, the interviewer administered the face-to-face questionnaire (appendix B). This questionnaire obtained some background information on the respondent, obtained basic information about reactions to environmental noises, served to provide direct training to the respondent in how to use the numerical scale which would later be administered by telephone, and recruited respondents for the complete survey program. The questionnaire included the "core questionnaire" which was used for the repeated telephone interviews. Respondents were given a numerical scale which they could attach to their telephones for use during the telephone phase (appendix B). The interview took approximately 20 minutes to administer. Though respondents did learn that the purpose of

the questionnaire was to study noise, neither the respondents nor the interviewers knew that helicopter noise was of any special interest.

Repeated short telephone interview phase (Sept. 14 to Nov. 9).- This interview consists of the "core questionnaire" which is included in all questionnaires in the study. The questionnaire was administered by telephone from a central location on the 22 repeated interview days. There are two important parts to the questionnaire (appendix). The initial time diary part (Q.1) obtains information about the times when respondents were at different locations (indoors, outdoors and out of the area) during the day. This information is used in the analysis to individualize the noise exposure for each respondent on the basis of the flights which occurred when the respondent was present. When combined with the information about window closing (Q.3) additional adjusted estimates of helicopter noise exposure can be formed. This diary question also served to help the respondent to carefully recall the events during the day before answering the following noise annoyance question.

The primary noise annoyance question for the analyses in the remainder of this report is Question 4:

We are going to rate (today's) neighborhood sounds on your scale which goes from 0, if you were "not at all annoyed" to 10 if you were "extremely annoyed." Remember to take into account both how many times you heard a sound as well as how much it bothered you when you did hear it. If you do not remember hearing a sound (today) don't rate it and I will mark it as "not heard."

Q4 When you were at home during the day (today) how much were you bothered or annoyed by the noise from . . . . . (cars) . . . ?

	RATING	NOT HEARD
a. Cars	☐☐	20
b. Trucks	☐☐	20
c. Motorcycles	☐☐	20
d. Jet airplanes	☐☐	20
e. Helicopters	☐☐	20
f. Small propeller airplanes	☐☐	20
g. Neighbors' tools or yard equipment	☐☐	20
h. Is there any other noise which bothered or annoyed you around here today? (DESCRIBE All. CIRCLE WORST)		20 (NONE)
_____ 1. IF YES How much did it bother you?	☐☐	

The entire question including the introduction was read each time. The question draws attention to both the numbers and noise levels of events. Helicopters are mentioned in the middle of a list of seven noise sources. This meant respondents would not be aware of the special interest in helicopter noise and also provided comparable information about reactions to other environmental noises.

Most respondents were contacted on the evening of the study day. If they were not at home, attempts continued on the following day until 12:00 noon. About 17 percent of the interviews took place on the morning after the study day. Respondents did not know which days they would be contacted. Telephone interviews were conducted on 5 non-noise days as well as the 17 controlled helicopter exposure days. The interviews generally lasted less than four minutes.

The questionnaire used on the next to the last day (appendix B) concluded with a slightly extended version which asked about activities outside of the 8 a.m. to 5 p.m. time period as well as about annoyance during the entire 24 hour period. Respondents were not aware of this slight addition while answering the standard core questions.

Concluding telephone interview phase (Nov. 9 to Nov. 28).- The concluding questionnaire (appendix B) began with the core questionnaire. The respondent did not know that this would be any diffferent than any of the preceeding interviews until after the standard telephone core questionnaire was completed. The concluding questionnaire repeated some of the initial questionnaire items about long-term annoyance, obtained additional details about reactions during the study period and included questions about attitudes toward the three types of aircraft noise.

Most of the interviews were conducted in the evening or during the day following the concluding study day (Nov. 9). Some of the interviews were conducted on later dates in order to obtain the important additional attitudinal and background data which were only requested in the concluding interview. The concluding interview was not counted as one of the 17 noise exposure days.

Social survey procedures.- The social survey was conducted in accord with widely accepted, standard procedures (see a standard textbook such as Moser and Kalton, 1971) which are designed to reduce errors in measurement and keep interviewer behavior from biasing responses. Thus, interviewers were instructed to read the questions exactly as written and record answers exactly as given. In addition to such standard procedures, a number of special steps were taken because of the repeated interview design, the need to conceal the interest in helicopters and the need to train some interviewers without previous professional interviewing experience.

The interviewer supervisor was a field interviewer supervisor for a national social survey research organization. Some interviewers had previous professional interviewing experience. An important part of the selection of other interviewers occurred during the job interview. The prospective interviewer was required to correctly conduct a mock interview based on home study of an interview methods instruction manual which was issued as part of the job application procedure.

Interviewer training was extensive and individualized. Interviewers studied both general interviewing technique materials as well as the "Environmental Survey Interviewer Instructions" (appendix D) which were specially prepared for this study. Six hours of home study were required. Interviewers received two days of personal instruction. Each interviewer conducted practice interviews during the training period until the supervisor was confident in the interviewer's abilities. Additional training sessions were conducted for the repeated telephone questionnaire, for the lengthened questionnaire used on the next to the last day, and for the concluding questionnaire.

Interviewing performance was closely supervised at all stages. The face-to-face interviews were edited and reviewed with the interviewer daily when necessary. The supervision was closest for the telephone interviewing phases. All interviews were conducted in a single room within earshot of the supervisor. The study investigator and supervisor systematically monitored telephone interviews. Any departures from standard techniques were immediately corrected. All interviews were edited daily. Computer consistency checks were run on all interview data and any problems were immediately discussed.

A number of steps were taken to maintain high interviewer morale and respondent cooperation during the lengthy study. Respondents were specifically asked to suggest times in the evening when they should not be called or when they would prefer to be called. Steps were taken to maintain morale after two nights when some unpleasant interviewing experiences might have affected interviewers. On the days immediately following these two nights (September 22 and October 19), interviewers read a prepared message to each respondent which assured the respondents of the value of the response and provided another opportunity to modify the calling time. The messages encouraged the respondents who reacted favorably which in turn provided morale-boosting positive feedback to interviewers. Morale was probably also generally increased by the use of the same interviewer with the same respondent for several weeks at a time. Interviewer interest was increased because the eight-week period was long enough that events happened in respondents' lives (births, deaths, vacations) in which interviewers became interested. The possibility that biases might occur because of high rapport levels was guarded against. Interviewers were not allowed to discuss noise or other neighborhood characteristics. A large proportion of the interviewing assignments were randomly redistributed twice during the study process so that any interviewer effects could be measured.

All possible steps were taken to conceal the helicopter noise goal from respondents and interviewers. The study was described as being carried out for the Department of Transportation (this department includes the Federal Aviation Administration). The interviewers were directly hired by The Bionetics Corporation. Interviewers were told that the study was being conducted at the NASA Langley Research Center because it was a convenient federal facility for the Department of Transportation. Contacts with Fort Eustis were maintained by separate personnel. The absence of interviews on most poor weather days was explained in terms of real difficulties in making noise measurements. NASA communications and labels for files and other documents referred to a Department of Transportation study. The Fort Eustis pilots and

other personnel involved in the study were briefed on the importance of not discussing the special controlled flight arrangements. Inquiries from local newspapers were satisfactorily handled with a full briefing after the study. This briefing led to an informative post-survey newspaper article. After the data collection had been completed all interviewers and respondents were debriefed with a full description of the study.

Noise Measurement Program

Attended noise measurements were made of both helicopter flights and ambient noise from 8 a.m. to 5 p.m. at one fixed location and two mobile locations on all 17 controlled noise exposure days and on three of the uncontrolled exposure days (table A-III). The fixed location was on the southern boundary of the study area. Each of the mobile site measurements was made at a new site on each day. Analogue recordings of helicopter flights were made with a Nagra IV SJ tape recorder at the fixed location. At the mobile sites the measurement equipment consisted of a B&K 4426 Noise Level Analyzer and Statistical Processor connected to a Type 2313 Alphanumeric Printer. All sites used the B&K 4134S half-inch microphone. The measurement teams were instructed to measure all helicopter flights which reached a maximum A-weighted noise level of 60 dB. These included all of the planned, controlled flights as well as some unplanned flights which could not be diverted from the area.

Maximum noise levels, LA (slow response), were obtained for all helicopter flights at all sites. For the mobile sites the values of LA were visually observed on the noise level analyzer. For the fixed sites, the analog recordings were later analyzed in the laboratory to provide four descriptors of each flight: LA, SEL, EPNL and PNL. The hourly ambient LEQ values were obtained at the mobile sites from continuous measurements of the A-weighted sound level during the time when helicopters were not audible.

Calculation of Daily Noise Indices

The data from all of the helicopter flyovers at each of the three noise measurement positions on each day were analyzed to calculate aggregated noise levels to represent the average helicopter noise environment over the entire study area on a particular day. These calculations had to take into account the variations in noise levels from all of the planned flights at a single site on a single day, the variations between the levels measured for the same planned flight at different sites, the presence of unplanned flights, the mixture of different types of helicopters introduced by unplanned flights, and the time period during which each respondent was actually at home on a particular study day. This section describes the calculation procedures. The effects of some of the departures from the original study design are discussed later under "Achieved Helicopter Noise Conditions".

The objective of the noise calculation program was to estimate the helicopter noise level to which each respondent was exposed on each day.

The basic input data were the physical noise data (noise level and time of occurance of each helicopter noise event at each of three noise measurement sites) and the social survey data (the location of the respondent at each minute during the day). Estimation of the individual exposures was a four-step process: (1) assignment of noise levels to each helicopter noise event at each noise measurement site on each day, (2) calculation of the noise environment at each site on each day, (3) estimation of the average noise environment for the entire study area for each day and (4) individualization of the noise exposure for each individual's activities on each day.

Assignment of noise levels to each helicopter noise event.- Noise levels were analyzed from each of three noise measurement sites based on each helicopter noise event which reached a maximum of 60 dB (LA). For the fixed site the values for all four noise metrics could be taken directly from the analysis of the analogue tapes (LA, SEL, EPNL and PNL). At the mobile sites only the values of LA were directly observed. The LA value was available for virtually every flight at all locations (on the rare occasions when there was a malfunction, the level from another site was used). The SEL values at the mobile sites (SEL_M) had to be estimated from the values of LA. Since the planned flights were measured at both the fixed and the mobile sites, the SEL values at the mobile sites could be estimated by calculating the difference between LA and SEL at the fixed sited (SEL_F-LA) and adding it to the measured value of LA at the mobile site ($SEL_M=LA_M + SEL_F-LA_F$). For the unplanned flights when the flight was only measured at the mobile site, the value of SEL at the mobile site was estimated based on the general relationship between the values of SEL and LA at the fixed site. This relationship was estimated from the regression of SEL on LA (SEL = 19.394 + LA • 0.884956).

Calculation of noise environment at each site on each day.- Logarithmic average values of SEL and LA were calculated for each site on each day. Numbers of flights were also counted. The values of SEL and numbers of flights were also calculated separately for each helicopter type: UH-1H and other impulsive types, UH-60A and other non-impulsive types, and unidentified helicopter types. All calculations were repeated twice, once for all flights with LA greater or equal to 60 dB and once for all flights with LA greater or equal to 66 dB. The 60 dB cut-off was used because this was the criterion used by the noise measurement team in recording flights. The 66 dB cut-off was included because this was the lowest noise level recorded from a planned flight.

Calculation of average noise environment for study area on each day.- The average noise levels and numbers of events for the study area were the arithmetic averages of the values at the three noise measurement sites on each day. This is a simple exercise for the total estimates but is somewhat more complex for the estimates of numbers and average SEL values for each helicopter type. The average SEL value for each type is the average for all identified helicopter types. (The average SEL for unidentified types was only used if there were no identified flights of the two major types on a day). The numbers of unidentified helicopter flights were allocated between the two helicopter types on the basis of the general experience with other unplanned, but identified helicopter noise flights. On planned UH-1H days, 75% of the unplanned, unidentified flights are estimated to be impulsive helicopters, while

on UH-60A days, 58% are estimated to be impulsive helicopters. This entire process was repeated for both the 60 and 66 dB noise event definitions.

Individualization of noise exposure for each respondent.- Two sets of individualized exposures were created for each respondent: exposures adjusted only for presence in area during flights ("respondent present" adjustment) and exposures adjusted for house attenuation as well as presence in area ("attenuation" adjustment). The "respondent present" adjustment is described in this section and used in most of the report. The "attenuation adjustment" is described in the "Activity Pattern and Location" section of this report. Respondents reported the times they were away from home for each study day. (Being at a neighbor's house within three houses was counted as being at home). Flights which took place when the respondent was away from home were subtracted from the "average" noise exposure (average for entire study area) to provide the "respondent present" adjusted set of noise data. The adjustments were relatively simple and direct for the planned flights because the time of the flights was uniform over the entire study area. Adjustments for the unplanned flights were made differently since the timing of the unplanned flights could not be determined individually for each respondent. The number of unplanned flights was individualized by multiplying the total number of unplanned flights on a day by the proportion of the time that the respondent had been at home during the nine-hour study day.

Values of LEQ were calculated on the basis of the numbers of flights and the average SEL values. EPNL and PNL values could not be determined for unplanned flights (appendix E). The few analyses using these metrics are thus based on the noise data from only the planned flights.

A total of 58 descriptors of the noise environment were created by the above procedures. Most of the analyses presented in the body of this report utilize descriptors which include both planned and unplanned flights and which have been individualized for the respondent's presence in the area.

DESCRIPTION OF THE STUDY COMMUNITY, SURVEY RESPONDENTS AND ACHIEVED HELICOPTER NOISE CONDITIONS

Information from the interviews and noise measurements about the study setting is examined in this section. The noise environments actually achieved by the controlled helicopter noise exposure program are also described.

Community Setting

The study area is a quiet, middle-class suburban area. Homes appear to be well maintained. No unusual neighborhood problems were apparent from visual examinations of the area. No widely preceived problems emerged in answer to the open-ended question (Q.2) at the beginning of the initial interview (a listing of the answers to Q.2 and other

selected questions is provided in appendix F). The most frequently mentioned problems related to some aspect of road traffic, not necessarily noise, or various types of community services. The respondents' assessments of their residential area in the initial interview (Q.3) can be compared with national averages from the 1977 Annual Housing Survey (Annual. . .1977, p. 45). The helicopter study respondents rated their area somewhat more highly than did the national sample: 42% rate the "neighborhood as an excellent place to live" compared to 35% for the nation as a whole. The absence of major problems is clear since 94% rated the area as "excellent" or "good" compared to 81% nationwide.

The ambient noise level measurements confirmed that there were not additional major noise sources in the area. Ambient noise levels (excluding helicopter noise) were measured at 32 different sites visited by the two mobile noise measurement teams. Ambient values of LEQ for 8 a.m. to 5 p.m. on study days ranged from 51 to 65 dB with a mean of 57 dB. The variations in ambient LEQ seem to be caused entirely by highly localized, infrequent noise events. When the ambient values were plotted on a map of the study area, there was not a tendency for higher levels to be found along particular types of roads or within particular subareas. Long-term average ambient noise levels are thus assumed to be equivalent for the entire study area.

The perceived relative importance of different noise sources in the area can be ascertained from the long-term ratings of seven noise sources in the initial face-to-face interview (Q.4). The mean annoyance score for each noise source on the 0 to 10 annoyance scale was computed ("not heard" is scored as 0). Helicopters received a rating of 2.5 which is less annoying than two sources (cars at 3.2 and motorcycles at 3.0), but more annoying than the other sources (jet airplanes, 2.4; trucks, 2.4; neighbors' tools and yard equiptment, 1.5; small propeller airplanes, 0.9). Respondents were given the opportunity to mention any other noise source not included in the check list (Q.4h). The only noise sources mentioned by at least 5% of the respondents were barking dogs (23%) and neighbors' audio equiptment (5%).

Discussions with air traffic officials at Fort Eustis and the local Federal Aviation Administration office confirmed that the study area is normally impacted by helicopter noise. No data are available, however, on the numbers or noise levels of these uncontrolled flights. The respondents' replies on the first and last interviews provide confirmation that the study area is normally impacted by helicopter noise. On the first interview, 94% of the respondents reported (Q.4) that they had heard helicopter flights over the past year and 77% reported that they were to some degree annoyed. Thus there was some awareness of helicopter noise before the survey began. The helicopter noise levels were almost certainly higher during the survey than before the survey. When respondents were asked about noise levels during the study period (Q.10, appendix F), the increase in the noise level had not been noticed by the 59% of the respondents who replied that the helicopter noise situation was no different than usual or the 5% of the respondents who reported that the helicopters were quieter than usual. Thirty-six percent of the respondents felt that the helicopters had been "more noisy than usual". A quite different indicator of the impact of the controlled helicopter noise exposure program is provided by the fact that the helicopter

flights did not provoke large numbers of public complaints. The personnel at Fort Eustis were aware of only two complaints from community residents about the helicopter noise during the study period. The study thus occurred in a community which was already familiar with helicopter noise and in which the change in helicopter noise produced by the experimental conditions was not even perceived as a change by about two-thirds of the respondents.

Description of Respondents and Their Perceptions of the Survey

The effects of various respondent characteristics on reactions to helicopter noise will be examined in a later section of this report. At this point possibly relevant demographic and attitudinal characteristics of respondents will be described. Respondents' perceptions of the survey process will be examined for any possible biases. Most of the data presented in this section can be found in appendix F in which the percentage breakdowns for answers to the survey questions are provided.

Demographic Characteristics.- Since the survey concerned only noise events which occurred during the daytime on specific days, only the part of the population which is normally at home during the daytime was eligible to be selected into the sample. The demographic characteristics of the sample are consistent with the sample selection rules but do not totally exclude people from most large demographic groups: 80% are women, 86% are not employed and 53% are at least forty years old. Only 12% of the sample are renting their homes.

The presence of large numbers of military installations in the area also affect the characteristics of the sample. Of the 432 employed people living in the surveyed households, 13% worked at Fort Eustis, 3% worked at an air force base (Langley Air Force Base) and 10% had some other type of military employment. Thus, though Fort Eustis does not dominate the area, roughly one-quarter of the sample had a person in their household connected with the armed services.

About half of the sample had lived in their present house more than seven years. Some 12% had moved into their present house in the preceding nine months.

The sample in this study differs from the general population in that it is predominately women, non-working persons, older than average, and includes a high percentage of households in which a member is employed in the armed services. The possibility that these characteristics affect helicopter noise response will be examined in the last section of this report.

Attitudinal Characteristics.- Attitudes toward different types of aircraft were asked about in the concluding interview (Q.13 and Q.14) after all the noise annoyance questions had been completed. Parallel questions were asked about the three types of aircraft: "Jet airplanes", "Helicopters", and "Small propeller airplanes". The answers to the questions show that respondents were aware of the origin of the helicopter flights in the area: 97% said that the helicopters were mainly military and 91% said that they were mainly connected with Fort Eustis.

Over half of the respondents gave responses which are associated with relatively positive evaluations of helicopters in three respects: 64% said that helicopters were "very important", 62% said that "pilots or other authorities" could not do anything to reduce the helicopter noise, and 67% did not feel that they were "ever" afraid that a helicopter might crash nearby. Some 5% said that they "usually" feared that a helicopter which they heard passing might crash. Comparisons with attitudes to other aircraft noise sources can not be usefully made with these data because of the very different and much lower noise exposure experienced from the other aircraft types.

Participation in the survey process.- The study differed from conventional surveys because the noise exposure was controlled, the primary interest in helicopters needed to be concealed from the respondents, respondents were densely clustered in a single area, extensive cooperation was required from respondents and data were repeatedly collected from the same respondents. All of these features posed potential problems which were partially assessed with questions in the concluding interview. The extensive precautions taken to conceal the specific interest in helicopters were successful. Less than 1% of the respondents on the concluding questionnaire thought that the study sponsors were "mainly interested in. . . helicopter" noise (Q.21). No respondent had heard a neighbor or family member say that the study was mainly about helicopter noise (Q.20). In spite of the fact that this question closely followed a series of questions which specially singled out aircraft noise, only 15 percent mentioned that they personally thought that the survey was mainly about aircraft noise (Q.21). The vast majority of the respondents (70 to 80%) simply accepted the offered explanation that the survey concerned all types of noise.

The concentration of the sample into a single area and the long time period for the survey do not appear to have generated a large amount of discussion about the study among neighbors. Some 74% (Q.18) did not know of anyone else who had been participating in this survey in which respondents were being repeatedly called back. Some 73% of the respondents had never talked to a neighbor about the study (Q.19) and only 8% had discussed the survey with a neighbor more than two times.

The previously mentioned high completion rate for the study (less than 2% failed to complete the concluding interview) indicates that it was possible to ensure the respondents' cooperation during the extended study period. Unsystematic observations based on discussions with interviewers at the time of the concluding interview suggest that most respondents were satisfied with the interviewing experience. Somewhat more quantitative evidence for this assertion is available from the answers to a question in the concluding interview about whether or not 40 dollars was a satisfactory honorarium (Q.23). Some 20% said that 40 dollars was "more than is needed", 72% said it was "about right" and only 8% said it was "too little". The general concensus of the interviewers was that the honorarium played an essential role in obtaining the high rate of continued cooperation.

The effect of repeated questioning about annoyance and feelings about noise will be directly assessed in a later section. The respondent's own awareness of any changes was asked about in the concluding

interview. Some 74% reported that the "asking about noise" had made them "notice the noise around here more" (Q.11). However 86% said that they felt it had not made them any more bothered than they had been before (Q.12). More people did however, report that they were "more bothered now" (12%), than reported that they were "less bothered" now (2%).

Achieved Helicopter Noise Environment

The exposure conditions presented in table I provided the basis for the scheduling of helicopter flights. The actual helicopter noise exposure conditions produced in the field were ascertained through the noise measurement program described in the previous data collection section of this report. Differences between predicted noise exposure levels and the actually measured levels might be expected in this study because of modifications in the design (one day was lost and one low number-of-events day was changed to a high number-of-events day), difficulties in scheduling flights (there were 6,7, or 10 flights on 3 of the days scheduled for 8 flights), the intrusion of other helicopter flights into the area (usually at a low noise level), and normal deviations of measured from predicted values under field conditions. The effects of these factors on the daily summary noise levels for the entire study area are presented in this section. Noise levels for specific study sites and specific study days can be found in appendix A.

Table II compares the actually measured noise environments with those predicted from the original study design. In the last three columns of table II, the noise environment has been calculated from different data bases: using only the planned flights, using all flights, and using all flights but individualizing the exposure for each respondent. The most important comparison is between the originally predicted environment (first column) and the individualized exposure (last column). In the first line the 77 dB(A) average of the daily mean maximum noise levels (LA) is within two decibels of the planned level of 79 dB(A). The numbers of helicopter flights are higher than originally designed, mainly because of the additional unplanned flights. As is generally the case for field conditions, the standard deviation of both noise levels and numbers of events ($\log_{10}$ number) is lower than planned (σ_{LA}=3.9 rather than 5.0 and $\sigma_{\log N}$ = 0.31 rather than 0.39). The correlation between noise level and number of events ($\log_{10}$ number) remained acceptable low (r=0.10 rather than 0.11). The single measurement day which was lost was one of the more heavily represented UH-1H days (11 rather than 12 days). In the last line of table II it is seen that on five days the flights from unplanned helicopter types were sufficiently numerous so that the nine-hour LEQ for unplanned helicopters was within 7 to 10 dB of the nine-hour LEQ for the planned helicopter flights.

The departures from the original study design considerably increased the complexity of the analyses of the noise data. A detailed examination of the data have however shown that these departures did not have an important effect on the study objectives. The range of noise conditions studied is consistent with the original study objectives. The analyses of the effects of non-standard flights in appendix G found that regression slopes should not be underestimated by more than 14% for the

worst case considered. The moderate intrusion of unplanned types of helicopters is controlled for in the analyses.

RESULTS AND DISCUSSION

The effects of helicopter noise levels, numbers of events, and helicopter type on annoyance with helicopter noise will be examined in this section. Alternative noise indices for helicopter noise will be evaluated and the reactions at particular helicopter noise levels will also be described. The effect of non-acoustical factors on helicopter noise annoyance will also be examined.

Effect of Numbers of Noise Events on Helicopter Noise Annoyance

The effects of the number of noise events and the noise levels of those events are examined in this section. The data are first presented in a relatively unstructured form before alternative noise indices are compared.

Form of the number-of-event effect.- In order to examine the pattern of the reactions to different noise levels and numbers of noise events, the individual daily annoyance scores have been averaged within number-of-event and noise level categories in figure 4. The number of helicopter noise events is individualized so as to represent the number of events occuring during the time when the person reported being at home on the particular day (see earlier section on Calculation of Daily Noise Indices). The noise level is the logarithmic average of the noise levels from those events (measured in SEL). Since the noise exposures are individualized, the individual annoyance ratings which are averaged to form a single data point in figure 4 may be drawn from several different test days. This procedure partially averages out the effects of possible extraneous differences which may affect responses on particular study days.

In figure 4 annoyance increases steadily with both number of noise events and noise level. There is a trend for a somewhat less steep relationship between noise level and annoyance in the lowest number-of-event groups. A simple, standard method for evaluating the importance of such an interaction effect is to perform a regression of annoyance on three terms: noise level, number of noise events ($\log_{10}N$), and a multiplicative interaction term (noise level multiplied by $\log_{10}N$). The interaction term is not statistically significant and its inclusion increases the amount of variance which can be explained by noise level and number of events by less than 0.2%. Thus there is not support for an interaction effect. The pattern in figure 4 might also be hypothesized to be summarized by an additive model, but one in which the form of the noise level effect is curvilinear, rather than linear. A test of the form of the noise level effect was performed by regressing annoyance on number of noise events ($\log_{10}N$), noise level and the noise level squared. There is not sufficient evidence to support such a curvilinear relationship since the partial regression coefficient for the squared noise level term is not statistically significant and the addition of the term increased the amount of explained variance by less than 0.2%.

Most noise indices are based on a logarithmic transformation of the number of events. In order to more closely examine the form of the number-of-event effect in this data set the effect of noise level is removed by normalizing reactions to a single noise level before examining the normalized annoyance reactions in six number-of-event groups. This normalization is performed by regressing annoyance on noise level and on a set of dummy variables which represent each number-of-event group. The resulting annoyance scores which are normalized to a SEL value of 87 (the mean of the average SEL levels for the sample) are plotted by number of noise events in figure 5. The figure also includes lines which are predicted from regression analyses in which number is entered as either the untransformed number of events or $\log_{10}$ number of events. The logarithmic transformation provides a better fit to the increase in annoyance with low numbers of events, while the linear representation comes closer to the annoyance expressed in the highest number-of-event group.

In order to compare the overall performance of the linear and logarithmically transformed representations of the numbers of noise events, multiple correlation coefficients were calculated. For the linear representation of number of events, annoyance was regressed on noise level and number of noise events. For the logarithmic representation of events annoyance was regressed on noise level and the logarithm of the number of events. When the multiple correlation coefficients for these two regression equations were compared it was found that the standard logarithmic transformation is slightly more highly correlated with annoyance. The differences between the two correlations are not statistically significant. When this analysis was repeated for other noise data bases and sample definitions (Appendix H) the same slight, but not statistically significant, differences were found. The same pattern persisted when helicopter type was entered into both regression equations.

Most widely used noise indices, including LEQ and LDN, are based on an additive-logarithmic model which is consistent with adding the average noise level and logarithmically transformed number of events. The findings from this study have been consistent with this logarithmic transformation of the number of events. (Of course the study provides no information about the nighttime weighting in LDN.) Though there is some evidence that annoyance may increase less slowly with noise level for low numbers of events, this interaction effect was found to be sufficiently weak so that reactions are adequately represented by the conventional additive model in the remaining analyses in this report.

Relative effect of noise level and number of events in the additive-logarithmic model.- In the additive-logarithmic model the main parameter of interest is one which summarizes the effect of number of noise events. The effect of number is conventionally expressed numerically as the number of decibels which increases annoyance by the same amount as a tenfold increase in number of noise events. The numerical value is thus the decibel equivalent of the annoyance caused by a one unit change in $\log_{10}N$. In this report this parameter is labeled the "decibel equivalent number effect". The parameter is estimated from the linear regression of annoyance (A) on the average levels of SEL (L) and the logarithm of the number of events ($\log_{10}N$):

$$A = B_0 + B_L \bullet L + B_N \bullet (\log_{10}N) \quad (1)$$

where B_0 is the intercept, and B_L and B_N are the unstandardized partial regression coefficients for noise level and number of events. These partial regression coefficients express the effect of noise level and number of events in terms of annoyance units. B_N is thus the increase in annoyance which would be expected if there were a one-unit increase in $\log_{10}N$ (ie. a ten-fold increase in number of noise events). B_L is the increase in annoyance which would be expected if there were a one-unit (decibel) increase in noise level. Since the values of B_N and B_L are expressed in units which are unique to the particular annoyance scale scoring, the values can not be directly compared across studies. In order to provide a value which can be compared and to provide a measure of the relative importance of noise level and number of events, the entire equation can be divided by B_L:

$$A/B_L = L + (B_N/B_L)\bullet(\log N) + B_0/B_L.$$

Following the convention established in the Heathrow aircraft noise annoyance studies (Second. . .1971), the decibel equivalent number effect is then defined as:

$$k_N = B_N/B_L$$

The value of k_N, the decibel equivalent number effect, in LEQ or LDN is 10. A higher value of k_N=15 is used in the British Noise and Number Index and in the Netherlands Total Noise Load Index (B Index). While the structure of the model is the same for all indices, the indices do differ in the definition of the noise level term. In the case of NNI it is the logarithmic average of the maximum perceived noise levels, PNL. This means that the duration of the events is not accounted for in the SEL noise level variable used in these analyses.

The full regression equations and the values of k_N for the effect of number of events from the helicopter noise survey are provided in table III. Standard errors for these values are shown in parentheses. The standard errors have been calculated using the bootstrap repeated replication technique which takes into account the variability introduced in sampling people, subareas and study days (see appendix I). The noise data used in Part A of table III include all flights while the data in Part B include only the planned flights. This second, less complete base for the noise level is necessary because EPNL and PNL could not be estimated for the unplanned flights (see appendix E). The two noise metrics which take account of the duration of the flyovers, SEL and EPNL, give very similiar estimates of k_N; 8.5 for SEL and 8.3 for EPNL. When the controls for helicopter type are introduced in table III, the values of k_n are only slightly changed for the SEL estimate (k_n changes from 8.5 to 7.9) and not changed at all for the EPNL estimate. The two metrics which are based only on maximum noise levels, LA and PNL give higher, more variable estimates which range from 10.6 to 15.8 in table III. These two maximum noise level metrics also result in lower multiple correlation coefficients (last column of Table III). The values of k_N in equations including L_A and PNL are also substantially reduced when helicopter type is included. This demonstrates that when only maximum noise level is considered, the effect of number of

events is overestimated because of the intercorrelations between peak noise level, duration and helicopter type.

The best estimates of the decibel equivalent number effect in table III are those based on SEL in Part A since these include all observed flights in the noise data base. The best estimate of the decibel equivalent number effect is thus k_N=8.1, if the helicopter type effect is ignored, or k_N=7.8, if helicopter type is included. These estimates fall slightly below the conventional factor of k_N=10 which is found in the equivalent energy indices. However, the values of the associated standard errors show that the 95% confidence intervals include k_N=10. The results thus are consistent with the weighting of k_N=10 which is implicit in LEQ and LDN. Methodological issues raised by the large standard errors associated with the estimates in table III are discussed in appendix I.

The square of the multiple correlation coefficient (last column of table III) is a measure of the percentage of the variance in the individual daily noise judgements which is explained by noise level. Only about 7% of the variance in these individual judgements is explained by noise level. This is consistent with the finding in most social surveys that only a small proportion of the variance in the individual annoyance scores is explained by noise level. As with all surveys, the correlation is much higher if a regression is performed in which the mean annoyance score is predicted for groups of judgements at the same noise level. When noise level is measured in LEQ (9 hr) and the mean annoyance scores are calculated for each of eight noise level groups, the correlation for these "grouped data" is r=0.95. In this case 90% of the variance is explained by noise level. Thus, as in all noise surveys, the noise level is a good predictor of average annoyance scores of groups.

The Effect of Helicopter Type

The planned flights on a single controlled exposure day were all of a single type of helicopter: either the relatively impulsive UN-1H helicopter or the less impulsive UH-60A helicopter. In spite of the occasional intrusion of other types of helicopters into the areas, the days remained relatively free of high noise level events from unplanned types of helicopters. The LEQ from unplanned types was always at least 7 dB below that for the planned type. A later analysis will take into account the mixture of types, but at this point the effect of helicopter type is analyzed by simply comparing the days on the basis of the type of helicopter which dominated the noise environment. This comparison is presented graphically in figure 6. Noise level is represented by LEQ (9 hr) in each case. The noise data are still individualized with values of LEQ being determined by only those flights which occurred when an individual was at home on the particular rating day. In figure 6 the annoyance is generally slightly higher on the relatively impulsive UH-1H days. This difference is sufficiently small and inconsistent that more complex analysis techniques had to be used.

Results from linear regression analyses of the helicopter type effect are presented in table III. In these regression analyses the helicopter type was scored zero (for the less-impulsive helicopter type days) or

one (for the impulsive helicopter type days). Partial regression coefficients were calculated from the regression of annoyance on noise level, number of events ($\log_{10}N$) and helicopter type. The ratio of the helicopter type partial regression coefficient to the noise level partial regression coefficient provides a measure of the decibel equivalence of a difference in helicopter type (k_H) which is exactly analogous to the previously calculated decibel equivalent number effect. For the analysis based on SEL using the most complete noise data (Part A of table III), the estimate of the helicopter type adjustment is the equivalent of 1.2 dB and not statistically significant (σ_{k_H}=1.5). In Part B of table III where only the planned flights are included in the calculation of noise levels, the helicopter type effect is virtually unchanged for SEL (1.8 dB). No helicopter type effect is found for EPNL. There is a much higher estimate for LA (k_H=5.8 dB). Thus, the simple maximum level metric provides distorted estimates by not including duration adjustments. The difference between the correction using SEL (1.8) and using EPNL (0.0) in table III is what would be expected from the findings of an analysis of the relationship between SEL and EPNL for the two helicopter types. When EPNL is predicted from SEL an additional 1.3 decibels need to be added for predictions of EPNL for the UH-1H helicopters (appendix E).

All the analyses thus far have considered all flights on any one day to be of the same type. As was noted earlier, flights of helicopter types which were not planned for a day were expected to have no important impact because the total LEQ values for unplanned flights were always at least 7 dB below the planned flights. A non-linear regression analysis was however carried out which takes into account the fact that there were a mixture of helicopter types on particular days. For a few respondents, the individualized noise levels of the two types were almost equal on some days. The non-linear regression is based on a model which implies that the differences in the effects of the two types of flights could be represented by adding a decibel adjustment to the noise level of each of the more annoying types of flights. This is the method of adjustment used for the nighttime penality in such indices as L_{DN}. The helicopter noise annoyance judgement (A) was regressed on the antilog of the nonimpulsive helicopter (LEQ_{Non}) and the antilog of the impulsive helicopter type (LEQ_{Imp}):

$$A = B_0 + B_L \bullet 10 \bullet \log_{10} \left(B_{Non} \bullet 10^{(LEQ_{Non}/10)} + B_{Imp} \bullet 10^{(LEQ_{Imp}/10)}\right)$$

The ratio of the partial regression coefficients for the helicopter types (B_{Imp}/B_{Non}) is thus the adjustment for the more impulsive helicopter type. The actual estimate for this ratio from the non-linear regression analysis is 1.3 and thus the decibel equivalence of the difference in reactions is 1.3 dB. Thus this method which takes account of individual differences in exposures to different mixes of helicopter types comes to the same conclusion as the previous analysis: any differences between the responses to the two helicopter types are small once duration has been accounted for in SEL.

The evidence reviewed in this section suggests that any differences in reactions to the two types of helicopters are small. With an A-

weighted, duration corrected SEL metric, the reactions to the UH-1H are not significantly greater. While it is assumed that any differences in reactions to the two types of helicopters included in this study are primarily a function of the differences in impulsiveness, it is certainly possible that other characteristics may have some effect. The data reviewed here do not provide support for an impulsiveness correction in a helicopter noise metric which already takes account of duration.

Evaluation of Alternative Noise Metrics

One of the bases for comparing noise metrics is the strength of their correlations with annoyance. This comparison can be based on the multiple correlation coefficients for the additive-log model in table III. The values of the multiple correlation coefficients for the noise and number model (i.e., no helicopter type correction) range from R=0.243 to R=0.271. The value for helicopter LEQ (9 hr, A-weighted, based on all observed flights) is r=0.263 which is virtually the same as the value of R=0.264 which is obtained for SEL based on all observed flights which yielded the value of k_N=8.1. This suggests that the difference between this value of k_N=8.1 and the value of k_N=10 in LEQ are not sufficiently large to reject LEQ as a representation of the noise environment. The small differences between the correlations for SEL and EPNL in Part B of table III are not statistically significant.

The conclusions which come from the comparison of multiple correlation coefficients in this section are consistent with those which came from the previous analyses of the effects of numbers of noise events and helicopter type. The inclusion of a measure of the duration of flights improves the ability of a noise index to predict annoyance and, equally importantly, can account for substantial differences between helicopter types. There is some evidence that EPNL provides a slightly better representation of helicopter noise events than does SEL.

The widely accepted A-weighted equivalent energy indices perform almost as well as the other indices examined here. Therefore LEQ (9 hr) is used almost exclusively in the remainder of this report and will certainly provide an adequate representation of noise level in the remaining analyses of personal and environmental characteristics which are not related to acoustical characteristics. In these analyses LEQ has again been individualized by excluding events which occurred when the respondent was absent.

Measuring the Degree of Annoyance with Helicopter Noise

The major analyses in this study examine the strength of the relationship between various acoustical parameters and the degree of annoyance with the noise experienced on particular days. A by-product of these analyses is information about the degree of short-term annoyance at different daily values of LEQ (9 hr). Some limited information is also available about longer term annoyance reactions.

The relationship between short-term annoyance judgements and helicopter noise.- The daily judgements of helicopter noise annoyance were all made

on the 0-10 annoyance scale. These judgements have been summarized in several different ways in figures 7 to 9.

The summary which uses the greatest amount of information about each annoyance judgement and which has been used in the regression analyses is presented in figure 7. Each annoyance judgement was given the number from 0 to 10 which was chosen by the respondent. The means of these annoyance judgements have been calculated and plotted by LEQ in figure 7. Annoyance increases steadily with noise level above an LEQ of roughly 45 dB but seems to be flat below that point. (The curve at these low noise levels should be interpreted with caution. The lack of a slope below 45 dB (LEQ) may be partly an artifact of the noise measurement procedures or of response errors for annoyance responses to single days.)

Other representations of the annoyance response are based on dichotomizations of the annoyance scale at particular scale points. The ten possible dichotomizations of the 0 to 10 scale are presented in figure 8 as the percentage of judgements scored at or above a particular scale value at each noise level. Annoyance is again seen to increase steadily with noise level above roughly 45 dB but to be unrelated to noise level at lower levels. The slopes at higher noise levels are less steep for the severe annoyance indicators than for the moderate annoyance dichotomizations.

There is not a clear scientific basis for favoring any one of the particular dichotomizations of the scale presented in figure 8. However, for ease of presentation, it has become conventional in the noise literature to dichotomize all judgements into those representing "high" annoyance and those which indicate something less than "high" annoyance. In graphical form this is then presented as the "percent highly annoyed". In this survey, as other surveys, respondents were not directly presented with the word "high" to describe their annoyance, thus some other strategy must be used to determine how people are to be divided into the "highly" and not "highly" annoyed. Four strategies are represented in figure 9.

Since all respondents may not attach the label "highly annoyed" to the same numerical value on the scale, the first strategy allowed each respondent to attach the label "highly annoyed" to the numerical value which was consistent with his feelings. Respondents were given an opportunity to do this in both the opening (Q.11) and concluding (Q.8) interviews in the following question:

> Q. Let's look at that zero to ten annoyance scale again: What is the lowest number you would use and still say you were "highly annoyed"?

When the respondent's own definition at the concluding interview is used as the "highly annoyed" dichotomization point then the uppermost line in figure 9 is created. The dichotomization based on the respondent's definition in the initial interview creates the next, slightly lower line, in figure 9.

A second strategy for choosing the "highly annoyed" dichotomization is based on previous work which used the classic Thurston equal-appear-

ing interval technique to assign numerical values to different descriptors of degree of annoyance (Levine, 1981). In that study a set of 94 subjects rated some 43 descriptors on a 7-point scale. The word "highly" annoyed received an average score of 6.12 on the 7-point scale which would be expected to be equivalent to a score of 8.53 on the 0 to 10 scale used in this survey. Using this second strategy the scale would be dichotomized between 8 and 9 for all respondents. The results of such a dichotomization are represented in figure 9 by the lowest line, which is half way between the lines generated by the 8 and 9 score dichotomizations.

A third, widely used strategy in noise publications is to accept Schultz's judgement about the number of scale points which should on a priori grounds be considered to represent "high" annoyance (Schultz, 1978). The number of scale points is counted and it is assumed that the upper 27% to 29% of the scale points will be chosen by "highly annoyed" respondents. Using this criterion a score of 8 (i.e., 3 of the 11 scale points represent high annoyance) is considered to be high annoyance and the second line from the bottom of figure 9 is created.

A fourth strategy was to "calibrate" the numerical scale with the answers to a verbal scale. This has been done by relating the long-term ratings of cars on the numerical scale to the long-term ratings of cars on verbal scales in both the initial (Q.5) and concluding questionnaires (Q.7). The amount of annoyance with cars was rated with one of five categories: "not at all, slightly, moderately, very, extremely". The top two categories, very and extremely, might be assumed to be about equivalent to the word "highly". Using this criterion, the 8.6% of the sample who were highly annoyed at the first interview fell between the 10.1% who scored $\geq$ 8 and the 5.3% who scored $\geq$ 9. On the last interview the 4.5% who were very or extremely annoyed were almost exactly the same as the 4.8% who scored $\geq$ 8. Thus the application of this fourth strategy is roughly consistent with the bottom two lines in figure 9.

The various definitions of "highly annoyed" in figure 9 provide alternative representations of the relationship between "high annoyance" and noise level which are separated by roughly 5 to 10 decibels. On purely logical grounds the two most soundly grounded definitions are probably the most extreme lines. The uppermost line is based on the respondents' own definitions after they had become thoroughly familiar with the scale and the lowermost line is based on accepted psychometric techniques for scaling verbal labels. In the next section the definitions can also be compared in terms of the strength of their correlations with noise level.

Comparison of the Correlations of Alternative Annoyance Scales with Noise Level.- In order to compare all the annoyance scoring schemes discussed in the previous section, thirteen of the alternative annoyance scalings presented in figures 7 to 9 are correlated with the daily helicopter noise levels in table IV. To allow for the curvilinear relationship, the noise level is represented in both linear and quadratic equations. As would be expected from psychometric theory, the highest correlation with noise level is obtained in the first line of table IV with the scale which is fully scored from 0 to 10. This is one of the reasons that the 0-10 scaling is used in all of the regression analyses in this

report. The various less severe annoyance scalings generally yield higher correlations than the "highly annoyed" dichotomizations. This is consistent with the greater slopes for the less severe annoyance ratings in figure 8. Of the various high annoyance scalings represented in figure 9, the respondent's own scaling on the last interview yields a slightly higher correlation than the other "high" annoyance scaling procedures, but the differences between the various scalings for the "highly annoyed" definitions are small. These analyses provide empirical support for the 0-10 scoring of the annoyance scale which has been used in the remainder of this report.

Long-term annoyance judgements.- Most previous social surveys of noise annoyance have related noise level to judgements of annoyance over long periods of time rather than to judgements of annoyance on a single day. Since the initial and concluding questionnaires include long-term annoyance judgements, it is possible to compare some aspects of long-term and short-term annoyance judgements in this data set.

The question in the initial questionnaire about annoyance with helicopter noise "this last year" is most similar to conventional social survey questions about long-term noise annoyance. The percentages who were highly annoyed on this long-term question have been calculated using the same strategies which were used on the short-term annoyance question: 23% are highly annoyed using the respondent's concluding interview definition of highly annoyed, 16% using the initial interview definition, 9% using either Schultz's definition or the verbal annoyance scale calibration and 7% using the Thurstone equal-appearing interval technique. Since the long-term helicopter noise level which led to these responses has not been measured, the relationship between long-term annoyance and helicopter noise level can not be exactly specified. The highest annoyance reaction for a given noise level is estimated if the noise level is assumed to be relatively high. The highest estimate of the long-term helicopter noise level is formed if the value of LDN (a nighttime weighted, 24-hour LEQ type measure) is assumed to be 52 dB (the average of the 9-hour LEQ values on the controlled noise exposure days). Even with this extreme assumption which tends to underestimate helicopter noise annoyance, the percentage highly annoyed is greater for helicopter noise in this study than would be predicted from Schultz's review of surveys which was based on questions about aircraft or road traffic noise (Schultz, 1978). It is not clear whether this shows that helicopter noise is more annoying than other aircraft noise or whether there is some other difference between the study methodologies which is creating the difference.

One possible important difference between the surveys is that this study asks about a single specific source, "helicopter noise", rather than a general source "aircraft noise". When single sources are asked about in social surveys of noise annoyance it is generally found that more people indicate annoyance with the single sources than would be expected from the more general question about the noise source. In an English road traffic survey, for example, more people said that they were bothered by one component of road traffic noise (26% bothered by motorcycles) than said that they were bothered by the sum of the road traffic noises (24% bothered by "cars, lorries and other road traffic") (Morton-Williams, et. al.: 1978; p. 35). This is also consistent with

a recent study in California which asked about "noise of large airliners" and also found that the responses were well above those predicted by Schultz (Fidell, et. al., 1982). Even if such methodological difficulties might be overcome, it is clear that the absence of long-term noise data means that the long-term annoyance response can not be directly compared with the results from conventional surveys. The remainder of this section discusses attempts to derive information about long-term responses from the short-term dose/response relationship.

Figure 10 presents four separate annoyance judgements for different time periods for each of 6 different transportation noise sources. The judgements are arranged in the order in which they were obtained from respondents. The conventional long-term question about annoyance for "this past year" was included in both the initial questionnaire (first bar in each line of figure 10) and the concluding questionnaire (last bar in each line). In spite of the fact that the time period asked about is almost the same for the first and last interview, the annoyance scores for aircraft appear to systematically change from the first to last interview. The aircraft scores all increase, while the ground transportation noise annoyance scores stay about the same or decrease. One possible explanation for the changes in the reactions to the aircraft sources is that there was some change in exposure during the period. The increased helicopter exposure was of course due to the planned flights during the study. There were also some increases in flights at the nearby commercial airport with the introduction of two regularly scheduled jet aircraft operations a day after several years of no scheduled jet aircraft movements. The number of regularly scheduled propeller operations were also increased during the study period. Though these commercial aircraft operations did not take place directly over the study area, it possible that some residents noticed them.

The shortest time period question included in figure 10 is the one which was repeated daily. The answers to these questions for each day on which a respondent was present are averaged to provide the "today" judgement in the second bar in each of the rows of figure 10. The same period covered by these short-term daily judgements was asked about in the concluding interview in terms of annoyance "during this eight-week period when we have been calling you". The results from this "eight-week" period question are presented in the third bar of each line.

A number of issues will be addressed with the data in figure 10 in later sections. At this point, however, the most striking feature is the fact that for helicopters and every other noise source, the average of the daily judgements is lower than any of the longer-term judgements. This is even true for the comparison with the "8-week" judgement which covers the same time period. Since the various time period questions are otherwise almost identically worded, the explanation for these systematic differences would not seem to be the question wording.

Of course the short-term questions only ask about daytime annoyance on the particular study days while the long-term questions would include any nighttime events or noise on weekends or other non-study days. Some consideration has been given to the possibility that the exclusion of these other periods might account for the long-term/short-term discrepancy for the helicopter responses. Helicopter annoyance for

the short-term, 9-hour day ratings and short-term 24-hour day ratings were compared on the next to last interview, but there was not evidence that the annoyance would be any higher for the 24-hour ratings (see appendix J for a full discussion of the problems in using this 24-hour rating). The gap between the average of the daily reactions and the other reactions also would not seem to be explained by the noise levels on days which were not surveyed. The average helicopter noise level on the 23 days of helicopter annoyance judgements was almost certainly greater than the helicopter noise level for the other days, including weekend and low number of flight days, in the eight-week period. In addition there are very few nighttime helicopter flights. It thus appears that differences in the objective noise exposures can not explain the fact that higher ratings are given for long-term than for the short-term annoyance judgements. It is clear that people are using the short-term annoyance judgements in a different way than they use the long-term annoyance judgements.

If the curves for "percentage highly annoyed" on the short-term question in figure 9 were simply compared with the relationship proposed by Schultz (Schultz, 1978) which is based on long-term annoyance questions, it would be seen that this short-term annoyance question seems to indicate more annoyance than the long-term annoyance question. Given the fact that the short-term judgements in this data set are already less than the long-term judgements, it might be argued that this shows that helicopter noise is more annoying than other noise sources. The data obtained in this study, however, are not suitable for drawing this conclusion. There is too much evidence that the absolute levels of annoyance in this study can not be simply compared with the absolute levels of annoyance found in conventional social surveys. Some of the types of problems which may be involved in such comparisons are evident in the increase in the long-term annoyance judgements for aircraft noise during the study period in figure 10. When the study design factors are examined later in this report it will be seen that there is definite evidence of a substantial increase in the daily annoyance scores over the first few interview days. While this will not be found to affect the other analyses in this report, it does mean that the percentage annoyed or highly annoyed in figures 5 and 6 would almost certainly be lower if the daily annoyance questions had been asked on a one-time basis as is done in a conventional, single interview survey.

On the basis of the evidence reviewed in this section it is clear that the absolute levels of annoyance recorded on these short-term questions should not be compared with the anoyance recorded on long-term questions. The data can not be used to estimate the percentage of the population which would be annoyed by long-term exposure at different noise levels.

The Effect of Non-acoustical Factors on Annoyance

Although the present project was designed to study the effect of acoustical factors on annoyance, some information has been acquired about the role of other factors. Both demographic and attitudinal characteristics of respondents have been examined. The examination of the effects of demographic characteristics will determine whether the un-

usual demographic characteristics of the sample could have biased the results. The impact on annoyance of the types of activities and the locations of those activities is explored. Aspects of the study methodology which might affect annoyance, including the effect of repeated interviews, are also discussed.

Meaningful indicators of the effect of non-acoustical factors.- Most simple measures of the effects of variables do not provide meaningful indicators of the importance of such non-acoustical factors as sex, age or education. A comparison of the average noise annoyance scores of people in two education groups suffers from two weaknesses. First it does not take into account the possibility that the people in the two groups may be exposed to different noise levels. Second, such a comparison is relatively uninformative because the measurements are all in the units of an arbitrary annoyance scale rather than in units which could easily be compared across studies. A meaningful indicator therefore must both remove the effects of noise level and measure the effects of the non-acoustical variables in readily understood units. The indicator used in this section and in tables V to VIII meets these requirements. The effects of noise level are removed in multiple regression analyses. The size of the effects of non-acoustical variables are measured in decibel units. The units are the number of decibels which would be required to produce the same effect on annoyance that the non-acoustical variable produces. These units are thus the decibel equivalent of the impact which a variable has on annoyance.

The measures of the effects of variables in table V are all given in these decibel equivalent units. The first variable in table V, Education, provides an example. In the last column "0.8 dB" means that college graduates were more annoyed than high school respondents by the equivalent of only a 0.8 decibel difference in noise level.

The method for calculating these decibel equivalent measures is described in the next three paragraphs. The first paragraph describes how the effect of noise level is removed in regression analyses. The next paragraph describes how the results are expressed in terms of decibels. Last, the method for correcting for small errors in noise measurements is described.

To understand the effects of non-acoustical factors on helicopter noise annoyance, it was first necessary to perform analyses which can remove the effects of the actual helicopter noise exposure. In tables V to VIII, this has been done though an analysis of the residuals from a regression analysis. This analysis was performed by first regressing the daily annoyance ratings on the daily helicopter noise levels (LEQ). The residual annoyance score for each respondent on each day was then calculated by subtracting the annoyance score predicted on the basis of noise level from the respondent's actual annoyance score. The resulting "residual" annoyance score is a measure of how far the respondent's annoyance on a particular day was above or below the average regression line for the entire sample. Respondents could then be characterized in terms of the average of these residual annoyance scores during the entire study period. This is the strategy which was adopted in table V, and thus yielded numbers of observations which were no greater than 338, the number of respondents in the study. Since these are residual annoy-

ance scores, they are deviations from the mean predicted annoyance and are positive if the respondent was more annoyed than average for the sample and negative if the respondent was less annoyed than average. It was found, for example that people in the lowest education group had a mean annoyance score of 0.093 points below the average.

These residual annoyance score values are not in themselves particularly meaningful. In table V the annoyance scores are presented in a more meaningful unit which is referred to as the "decibel equivalent of the annoyance score" in this report. In this study the regression coefficient of B_L=0.24 indicates that each decibel measured in LEQ was associated with an increase in annoyance of 0.24 scale points on the annoyance scale. With this regression coefficient the annoyance can now be expressed in decibel units. Thus, for education in table V, instead stating that the high school education group had an annoyance score which was 0.093 points below the average annoyance score on the 0 to 10 annoyance scale, the presentation shows that the high school education group had an annoyance score which was the equivalent of 0.4 decibels (0.093/ 0.24=0.4) below the average.

The 0.24 annoyance units for each decibel change in noise level was estimated from a regression analysis corrected for errors in measuring noise levels. The daily helicopter noise annoyance scores for people who were home during at least one planned flight (N=4178) were regressed on the individualized helicopter noise LEQ (9 hr). The unstandardized regression coefficient from this analysis is B_L=0.22. Since the data did not show a decrease in annoyance below 45 LEQ, all values of LEQ below 45 were set equal to 45. Given the estimated reliability coefficient of 0.93 for the measure of LEQ (appendix G), this regression coefficient was corrected to B_L=0.24 (0.22./0.93= 0.24).

Demographic Characteristics.- Both the initial and concluding interviews provide information about the demographic characteristics of the respondents. The relations between these characteristics and helicopter noise annoyance are presented in table V. The effects of all of these variables are small and not statistically significant. The last column of table V shows that there is no more than a 1.4 decibel effect associated with any of the variables, except for the lengtn of residence with a possible 2.6 decibel effect. The lack of an effect for sex, employment status, and military employment are especially important since this suggests that having an unrepresentative sample in these respects has not biased the results of the survey. The logarithm of the length (months) of residence is more closely related to annoyance than a simple linear representation of length of residence, but the effect is small and not statistically significant ($p>.05$). In short, there is no evidence that the unusual demographic characteristics of the sample have biased this study's results.

Attitudinal Characteristics.- The concluding interview included single question measurements of some of the attitudes which are often associated with noise annoyance. As in other studies, most of these attitudes were found to have a strong and statistically significant association with annoyance.

The results for the "Fear" question in table VI show that there was the equivalent of 1.7 decibels less annoyance than average for those respondents who answered "no" to the question:

Q.13a When you hear a helicopter fly overhead, are you ever afraid it might crash nearby?

The last column of the table helps to summarize the size of this effect by noting that the difference between the most fearful (sometimes or usually fear a helicopter might crash) and the least fearful (not afraid it might crash) is the equivalent of 6.8 decibels (1.7 + 5.1= 6.8).

On the "importance of helicopters" question, those who felt that the helicopter flights were "very important" were less annoyed than respondents who reported that the flights were "a little important" or "not important at all" (the decibel equivalence of the difference in the annoyance scores is 3.5 dB).

As in most surveys, people who feel that it is possible for the authorities to considerably reduce the noise are much more annoyed than people who feel that nothing can be done about the noise. This concept of "preventability" was an obviously integral aspect of annoyance for one respondent who explained that she did not feel it made sense to be annoyed by a sound if there was nothing which could be done about it.

Annoyance with helicopter noise is also associated with annoyance toward other sounds in the neighborhood. Thus those who are more likely to rate cars as annoying in table VI are also more likely to rate helicopters as more annoying. Those who positively rate their neighborhood as an "excellent or good place to live" are less annoyed, but the small number of respondents in the negative evaluation category (N=22) is not enough to make the difference statistically significant.

Findings about attitudinal variables are of relatively little practical importance for predicting annoyance since information about attitudes is not available for planning purposes. For this particular study the main significance is the finding that attitudes do affect these short-term annoyance judgements in much the same way that attitudes have been found to affect long-term annoyance judgements in other surveys. This provides one other indication that the findings from this survey should be similar to those in more conventional long-term surveys.

Activity Pattern and Location.- Respondents were asked to report the times, if any, when they attempted to sleep during each of the 9-hour study days. This information was collated with the information about the timing of the controlled flights to determine whether a helicopter noise event occurred during this theoretically more noise-sensitive period. In table VII, 176 of the respondents' annoyance ratings were obtained from a day in which the respondent had attempted to sleep during a flyover. This appears to have had virtually no effect on the daily annoyance score. There is only the equivalent of a 1.3 dB difference (not significant, $p>.05$) between those who tried to sleep and those who did not.

The location of the respondent during each helicopter flight on a study day affects the noise levels at the respondent's ear on any particular study day. The discrepancy between this "at the ear" exposure and the level measured out-of-doors for the entire day has already been partially corrected by individualizing the exposures according to whether or not the person was present in the area during each planned flight (see the noise estimation procedure section in the study design part of this report). An additional "attentuation adjustment" could also be calculated from data collected in the daily telephone questionnaire.

In the daily telephone interview the respondents reported the times they were inside their house, outside their house, or away from their home on the particular day (being at a neighbor's house within three houses was treated the same as oeing at their own house). They also reported whether their windows during the day were "all closed", "mostly closed in the rooms you were in", or "mostly open in the rooms you were in". Of course, the adjustment for being away from home has already been included in the individualized noise measure. To calculate the "attenuation adjustment" noise levels need to be reduced if the respondent reported being inside the house at the time the noise measurement team reported observing the flight. The amount by which the level should be reduced depends on the information about windows: 20 dB if windows were all closed, 17 dB if they were mostly closed, and 14 dB if they were mostly open. (These adjustments are based on a report comparing warm and cold climate houses in the United States, House Noise..., 1981). The adjustments were calculated for each person for each flight which occurred when the individual was reported to be inside the house. Any unplanned flights (thus flights for which the timing was not available) were assumed to be reduced by the same amount as the average of the reductions for the planned flights for the particular respondent on the particular day.

The reduction in annoyance associated with these attenuation adjustments is shown in the last entry in table VII. Respondents with an attenuation adjustment of 0 to 4 decibels had annoyance scores which were the equivalent of 2.7 dB higher than the average for the sample as a whole. The impact of this attenuation adjustment can be averaged over all noise levels through a regression analysis: a 3 dB reduction in attenuation is required to bring about the same reduction in annoyance that a 1 dB reduction in noise from the source could bring about. If these estimates are correct then a reduction in sound level due to attenuation near the receiver is less effective than a reduction in sound level achieved by reducing the noise from the source.

The relative impact of this "attenuation adjustment" and the previous "respondent present" adjustment has been quantified in a multiple regression analysis. The daily helicopter noise annoyance was regressed on three terms: the noise level as measured at the measurement sites for 9 hours, the "respondent present" adjustment, and the "attenuation" adjustment. The analysis was only carried out for the respondents above LEQ 45, dB(A), to avoid the problems in non-linearity. The resulting unstandardized partial regression coefficients for the measured noise level and the "respondent present" adjustments are similar (0.24 and 0.30 respectively) but the adjustment for the attenuation adjustment is

much smaller (0.07) but still statistically significant. Thus there is again some evidence that the attenuation adjustment is smaller. Just how much smaller can not be reliably estimated with these data. The size of the effect of the attenuation adjustment has almost certainly been partially underestimated because of greater errors in specifying the value of the attenuation estimate than in specifying the value of the other acoustical variables.

The information about activity patterns has thus suggested that attempting to take a nap during a flyover has no additional effect on annoyance for the day as a whole. Being indoors during a flyover does however appear to reduce annoyance, though by less than the difference in the indoor and outdoor noise levels would suggest.

Variables Associated with the Study Design.- The major subject for this section is the effect of the repeated interviewing process on annoyance judgements. First, however, several other aspects of the design will be examined.

It was noted earlier that in spite of the compact clustering of respondents with repeated interviews there was very little knowledge about the participation of neighbors in the study. In table VIII it can be seen that the few people who did know that neighbors were participating in the study were no more annoyed than those who did not know. In a follow-up question (Q.19 in table VIII) the annoyance of those who reported talking to a neighbor was no greater than the equivalent of 1 decibel more than those who had not talked.

Respondents were asked whether they had happened to spend any more or less time at home during the study period than was normal for them. In Question 8 it is seen that this did not consistently affect annoyance.

It was reported earlier that most respondents seemed to be satisfied with their participation in the study and with the amount of the honorarium which was provided for participation. In table VIII those who said the honorarium was "about right" are the equivalent of about 2 dB less annoyed [not significant, $p>.05$] than either those who felt they were paid too little or those who felt they were paid too much. Thus there does not seem to be evidence that those who especially disliked the study were any more annoyed than those who especially liked the study.

The success in concealing the interest in helicopter noise from the respondents was reported earlier. Whether or not knowledge of the purposes would have biased responses can not be determined. The evidence in table VIII is not consistent. While those who thought the study was about aircraft noise in general were less annoyed than people who thought the study was about all types of noise, those who thought that the study was about jet aircraft noise were more annoyed than average. None of these differences is significant for the conventional $p<.05$ significance test. No conclusions can be drawn about the effect of believing the study was about helicopter noise, because only three people thought the study was about helicopter noise.

The main remaining question is whether participation in the extended study process affected the respondents' annoyance with helicopter

noise. The reports of the replies to Questions 11 and 12 in table VIII provide only weak evidence for any effect. People who say the study led them to notice noises more are the equivalent of 1 decibel more annoyed than those who did not report noticing the noise more. Those who said they had become more bothered by noise are the equivalent of 3 decibels more annoyed than those who say that they had not become more annoyed. None of these results is significant. These self-reports provide less solid evidence than an examination of the actual change in the annoyance scores.

From the earlier discussion of figure 10 it was seen that the long-term annoyance ratings for all three types of aircraft noise did increase from the first to the last interview. The critical point with respect to the study design is however whether or not the daily annoyance scores increased over the duration of the study in such a way as to affect the study estimates. In order to examine the pattern of answers across study days it is necessary to remove the effects of noise level. Two analyses are used to examine the pattern of daily annoyance scores after the effects of noise level have been removed. The first analysis is a simple graphical analysis based on the comparison of groups of days with similar noise exposures. The second analysis is an analysis of the residuals from a multiple regression.

For the simple graphical analysis, three sets of similar noise exposure days have been identified in figure 11. The days within each of the similar noise exposure groups are connected by lines. The ten days which did not fit into either of the three sets are also plotted (triangle symbol), but are not connected by lines.

On the helicopter annoyance graph (top section of figure 11), the low exposure line (lowest of the three lines in the helicopter graph) shows a definite increase from the first two interviews to the interviews on day 8 and beyond. This increase is especially important if it is realized that there may well have been some flights on the first two days, but there were definitely not any flights on days 8 and 30. Beyond day 8 there is only a moderate trend, if any, toward increasing annoyance on similar exposure days. This analysis thus suggests that annoyance increased rapidly over the first few days but only slowly in the later stages of the study.

Examination of the annoyance responses for the other two aircraft noise sources in figure 11 shows a somewhat similar trend in that the lowest annoyance is registered on the first two days, with any possible increases in annoyance beyond those days being small. The greater variability in the day-to-day reactions to aircraft than in the reactions to road traffic noises (in figure 11) is probably either due to more true variation in day-to-day aircraft noise levels or to people not being aware of day-to-day variations in noise levels from cars. A more important point however is that reactions toward cars do not change during the period. The reactions to trucks and motorcycles (not presented in the figure) resembled the reaction to cars in that there was no trend toward increasing annoyance. The examination of the three sets of equal helicopter noise exposure days across all four reactions in figure 11 shows that annoyance for other sources is not simply following the helicopter reactions on these days. From these figures it appears that

annoyance toward aircraft on both the initial face-to-face and initial telephone interviews was lower than on subsequent interviews. If this is the only pattern in the data, then no difficulties will arise in analyzing reactions to helicopter noise, since the first controlled noise exposure day was day 7. The finding does however suggest that studies using these types of repeated interviews should be especially concerned about reactions on the first few days of the study.

The explanation for the contrast in the reactions to aircraft (an increase in annoyance after the first two interviews) and the reactions to other noise sources (no change over time) is not clear. As was noted earlier, one possible explanation is that there was some increase in jet and propeller aircraft noise during the study period. It might also be speculated that for road traffic noise it is relatively easy on even the first day for people to give accurate accounts of their feelings because the visual presence of road traffic helps them remember road traffic noise events. Aircraft, on the other hand, may be better remembered after the questionnaire has drawn attention to them over several days. Such an accuracy hypothesis could not explain all the patterns. The fact that days 8 and 30 which had no helicopter noise exposure still received a mean response of 0.9 and 1.1 suggests that there is more than a simple increase in the accuracy of helicopter annoyance judgements. This pattern is consistent with the apparent insensitivity to differences in helicopter noise below 45 dB(A) LEQ in figure 7.

The graphical analysis which has thus far been applied has been based on the uncontrolled (low) exposure days and on only some of the controlled exposure days. The second, more sensitive, analysis method, multiple regression, is applied to all the controlled exposure days, but excludes the uncontrolled exposure days.

A multiple regression of helicopter annoyance on helicopter noise level is the basis for the last entry in table VIII. The residual annoyance scores which have been collapsed into groups in table VIII are graphed by study day in figure 12. Without the pre-noise-exposure days, there is no longer a trend toward increasing annoyance with time; instead there is a peak in annoyance in the middle of the study period. In order to better describe this pattern and to calculate the statistical significance level, annoyance is regressed on helicopter LEQ, number of days elapsed and number of days elapsed squared. For both the number of days and the squared number-of-days term, the significance level is very close to the conventionally accepted $p=.05$ level. The pattern of response described by this quadratic representation of number of days, is a peaking of annoyance toward the middle of the study period. The multiple regression equation with the quadratic representation of the number of days predicts that the peak is at about day 30. The annoyance on that day is the equivalent of about 3 dB greater than the annoyance at either the beginning of the controlled noise exposure period (day 7) or the end of the period (day 55).

While a peaking of annoyance in the middle of the study period does not appear to be unreasonable, no particular theory had anticipated the pattern. The original hypothesis was that there would be an increase in annoyance during the study period. This hypothesis was not upheld by the analyses: neither a number-of-days term by itself nor a

logarithmic transformation of the number of days was related to annoyance in multiple regression analyses ($p>0.5$). In view of the absence of a nypotheses, the rather low significance level, and the moderate to weak effect (approximately 3 dB), it is not possible to definitely conclude that there is a study-day effect.

Even if the study day affects annoyance, the multiple regression analyses show that study day does not affect conclusions about the annoyance/noise level (LEQ) relationship or the conclusion about the weakness of the helicopter-type effect. Multiple regression analyses of the relative effect of number of noise events and noise level (SEL) were also repeated with the number-of-day and number-of-day-squared terms. It was found that the estimate of the decibel equivalent of the number effect did increase from $k_N=8.5$ to $k_N=15.1$. However, the 95% confidence interval for this new estimate becomes so large ($k_N=0.7$ to $k_N=30$) as to make the estimate almost useless. Both the value of $k_N=10$ used in LEQ as well as the originally calculated value of $k_N=8.5$ are of course included in the 95% confidence interval.

There is not definitive evidence on the effect of the number of days on annoyance. There is, however, enough evidence to suggest that the study day variable is an important variable to consider in the design of future studies.

The information about the study design examined in this section found no evidence that responses were biased by talking with neighbors, the degree of satisfaction with participation in the study, or beliefs about the subject of the study. There is some mixed evidence that annoyance responses may have been affected by the length of the study period. There is no evidence, however, that the major study findings about the effects of numbers of noise events have been affected by the length of the study period.

CONCLUSIONS

The patterns of reactions to helicopter noise observed in this study are broadly consistent with the additive-logarithmic model implied by LEQ-based noise indices. Reactions are represented as well or better by a logarithmic transformation of the number of noise events than by a simple linear representation of number of noise events. The data also support the inclusion of duration as it is represented in the LEQ-based indices. The relative effect of noise level and number of events is not significantly different from that implied by the LEQ-based indices.

The reactions to relatively impulsive and non-impulsive helicopters are found to be approximately equivalent when duration is taken into account in noise indices. SEL and EPNL appear to be approximately equally successful in representing noise level in relation to human response. Reactions to helicopter noise increased steadily above 45 dB (LEQ, for 9-hour study day).

The new type of design used in this study has succeeded in providing estimates of parameters in a noise reaction model which could not have been economically obtained from conventional study designs. Though

the estimates are valuable they are still less precise than is desirable. An important source of imprecision is day-to-day variation in reactions which is not explained by noise level. Reactions to daily noise levels measured with the repeated interviews are similar in a number of important respects to those measured in conventional social surveys. The daily annoyance reactions are sensitive to changes in the daily noise environment. As in conventional surveys, responses are not related to demographic characteristics of respondents. In this shortterm annoyance study as in previous long-term annoyance studies, the responses are related to such attitudinal variables as perceptions of danger from aircraft, beliefs about the preventability of aircraft noise, and feelings about the local area. There were however some systematic changes in the level of aircraft noise annoyance during the course of the study. These did not interfere with the achievement of this particular study's goals.

REFERENCES

Annual Housing Survey: Part F, Financial Characteristics by Indicators of Housing and Neighborhood Quality, 1977, U.S. Dept. of Commerce: Bureau of the Census, Washington, D.C.

Bennett, R.L. and Pearsons, K.S.: 1981, Handbook of Aircraft Noise Metrics, NASA Contractor Report 3406, March 1981.

Diaconis, P. and Efron, B.: 1983, Computer-Intensive Methods in Statistics. Scientific American, May 1983, pp. 116-130.

Fidell, S.; Mills, J.; Teffeteller, S.; and Pearsons, K.: 1982. Community Response to Three Noise Abatement Departure Procedures at John Wayne Airport. BBN report 4743, Bolt Beranek and Newman, Cambridge, Mass.

House Noise Reduction Measurements for Use in Studies of Aircraft Flyover Noise: 1971, Aerospace Information Report 1081, Society of Automotive Engineers, Oct. 1971.

Morton-Williams, J.; Hedges, B.; and Fernando, E.: 1978, Road Traffic and the Environment. Social and Community Planning Research, London.

Moser, C.A. and Kalton, G.: 1971, Survey Methods in Social Investigation, (Second Edition). Heinemann, London.

Schultz, T.J.: 1978, Synthesis of Social Surveys on Noise Annoyance. J. Acoust. Soc. of America, vol. 64, pp. 377-405.

Second Survey of Aircraft Noise Annoyance Around London (Heathrow) Airport. 1971, Her Majesty's Stationery Office, London.

TABLE I: NUMBER OF STUDY DAYS PLANNED
FOR EACH TYPE OF EXPOSURE CONDITION

Expected noise level LA, dB	Altitude of aircraft (feet)	Helicopter type	Number of flights scheduled					
			1 per day	2 per day	4 per day	8 per day	16 per day	32 per day
85	500	UH-1H		2days		2days		
		UH-60A		2days		2days		
75	1500	UH-1H	1day	2days	1day	2days	1day	1day
		UH-60A		1day		1day		

TABLE II: COMPARISON OF DESIGNED NOISE ENVIRONMENTS AND MEASURED NOISE ENVIRONMENTS

Characteristic	Noise environment defined by			
	Predictions from noise exposure design (see table I) (N=18 days)	Measured environment		
		Only planned flights (N=17 days)	All flights (N=17 days)	Individualized exposure (N=4178 respondents)
Maximum Sound Level (LA)				
Mean	79	78	77	77
Standard deviation	5.0	4.4	4.0	3.9
Number of helicopter noise events				
Mean number (N)	6.8	8.2	12.6	10.9
Mean $\log_{10}N$	0.65	0.75	1.00	0.93
Standard deviation ($\log_{10}N$)	0.39	0.39	0.30	0.31
Correlation of LA and $\text{Log}_{10}N$	-0.11	0.03	0.15	0.10
Number of days				
UH-60A Days	6	6	6	6
UH-1H Days	12	11	11	11
Number of days with specified difference between LEQ values (D_{LEQ}) for planned and unplanned types of helicopters				
$D_{LEQ}<7$	0	0	0	---
$7<D_{LEQ}<10$	0	0	5 days	---
$D_{LEQ}>20$	0	0	12 days	---

TABLE III: EFFECTS OF NOISE LEVEL, NUMBER OF EVENTS AND HELICOPTER TYPE FOR FOUR NOISE METRICS (4178 INTERVIEWS).

Noise metric	Regression equation[a]				Decibel equivalents (dB) of effects for:		Multiple correlation coefficient:
	Intercept	Unstandardized regression coefficients for:					
	B_0	Noise Level B_L (σ_{B_L})	Number[b] B_N (σ_{B_N})	Helicopter Type B_H (σ_{B_H})	Number[b] $k_N=B_H/B_L$ (σ_{k_N})	Helicopter type $k_H=B_H/B_L$ (σ_{k_H})	
	PART A: All observed flights in noise data base						
SEL	-16.51	0.20*** (0.06)	1.64*** (0.44)		8.1*** (3.1)		.264
	-16.46	0.20*** (0.06)	1.57** (0.48)	0.24 (0.30)	7.8** (2.8)	1.2 (1.5)	.267
LA	-8.36	0.12* (0.05)	1.77*** (0.50)		14.5 (8.4)		.246
	-10.27	0.14*** (0.04)	1.53** (0.49)	0.65* (0.28)	10.6** (4.1)	4.5* (2.2)	.262
	PART B: Only planned flights in noise data base						
SEL	-14.60	0.18* (0.04)	1.55*** (0.40)		8.5** (3.0)		.263
	-14.97	0.19*** (0.04)	1.46*** (0.42)	0.33 (0.23)	7.9** (2.4)	1.8 (1.6)	.267
EPNL	-16.21	0.19*** (0.04)	1.60*** (0.36)		8.3*** (2.2)		.271
	-16.24	0.19*** (0.04)	1.60*** (0.39)	-0.01 (0.28)	8.3*** (2.3)	0.0 (1.4)	.271
LA	-6.12	0.10* (0.04)	1.57*** (0.46)		15.8 (30.2)		.243
	-8.82	0.13*** (0.03)	1.37** (0.45)	0.75** (0.27)	10.6** (3.6)	5.8* (2.5)	.263
PNL	-10.46	0.13*** (0.03)	1.65*** (0.41)		12.5* (5.0)		.260
	-11.48	0.14*** (0.03)	1.53*** (0.41)	0.47 (0.27)	10.9** (3.4)	3.3 (2.1)	.269

Significance levels: * =0.05, ** =0.01, *** =0.001

a. All terms are defined in Equation 1 in the text.
b. Number is transformed logarithmically for the regression coefficients in this table.

TABLE IV: MULTIPLE CORRELATION COEFFICIENTS OF HELICOPTER LEQ WITH ALTERNATIVE SCORINGS OF THE DAILY HELICOPTER NOISE ANNOYANCE SCALE (N=4079)[a]

Scorings of 0-10 annoyance scale	Multiple Correlation Coefficient when noise level (Helicopter LEQ) is represented in a: Linear equation	Quadratic equation	Comments
Part A: Scale scored 0-10			
0-10	0.268	0.276	Used in most analyses in this paper
Part B: Scale dichotomized at same point for all respondents			
1-10 = Annoyed	.253	.253	Least severe annoyance dichotomization
2-10 = Annoyed	.239	.240	
3-10 = Annoyed	.240	.242	
4-10 = Annoyed	.224	.230	
5-10 = Annoyed	.216	.255	
6-10 = Annoyed	.207	.219	
7-10 = Annoyed	.188	.206	
8-10 = Annoyed	.182	.204	Schultz's a priori criteria for "Highly annoyed"
9-10 = Annoyed	.148	.159	Thurstone scaling results
10 = Annoyed	.123	.133	Most severe annoyance dichotomization
Part C: Scale individually dichotomized based upon the respondent's definition of "Highly annoyed"			
Individually determined dichotomy	.190	.199	Initial interview definition (Q.11)
Individually determined dichotomy	.206	.211	Final interview definition (Q.9)

[a] These 4079 respondents had good data on all questions including the two numerical definitions of "highly annoyed" (Q11, Initial interview; Q9 Final interview)

TABLE V: EFFECTS OF DEMOGRAPHIC CHARACTERISTICS ON REACTIONS TO HELICOPTER NOISE

Characteristic (Question Number)[a]	Deviation from mean reaction for:[b]	Summary of effect
Education (Q16-C)	[Highest education level] <High school: -0.4 (N=153) Some college: 0.1 (N=108) >College graduate: 0.4 (N=65)	College graduates are the equivalent of 0.8 dB [NS] more annoyed than high school
Sex (Q21-I)	[Sex of respondent] Female: 0.0 (N=266) Male: 0.1 (N=66)	Males are the equivalent of 0.1 dB [NS] more annoyed
Age (Q15-C)	[Age of respondent (years)] 18-29: 0.3 (N=50) 30-39: 0.6 (N=22) 40-49: -0.3 (N=79) 50-59: 0.0 (N=49) >60: -0.6 (N=72)	People over 60 are the equivalent of 0.9 dB [NS] more annoyed than those <30[c]
Home ownership (Q13-I)	[House tenure] Own: -0.2 (N=295) Rent: 1.6 (N=37)	Renters are the equivalent of 1.8 dB [NS] less annoyed than owners
Employment status (Q14-I)	[Respondent's employment] Employed: -1.2 (N=54) Not employed: 0.2 (N=278)	Employed people are the equivalent of 1.4 dB [NS] less annoyed
Military employment (Q14-I)	[Household includes] Military employee: 0.1 (N=84) No military: -0.2 (N=248)	Military employee households are the equivalent of 0.3 dB [NS] more annoyed
Length of residence (Q12-I)	[Years in the house] <0.7: 1.5 (N=38) 0.7-5: 1.0 (N=117) 6-10: -0.9 (N=77) 11-80: -1.1 (N=100)	The newest residents[d] are the equivalent of 2.6 dB [NS] more annoyed than the longest

NS = Not Significant for $p<.05$ test

a. The letters after the dash indicated following: I = Initial questionnaire C = Concluding questionnaire.

b. As explained in the text the decibel equivalent values presented in the body of the table can be simply converted back into annoyance score units by multiplying by 0.24, the corrected regression coefficient for noise level.

c. A regression of annoyance on LEQ and years of age provides the estimate that each 30 year increase in age is equivalent to a 1 decibel increase in noise level.

d. A regression of annoyance on LEQ and $\log_{10}$ years lived in house provides the estimate that each ten-fold increase in amount of time lived in the house is equivalent to a 2 dB increase in noise level.

TABLE VI. - RELATION BETWEEN ATTITUDES AND REACTIONS TO HELICOPTER NOISE

Characteristic (Question Number)[a]	Deviation from mean reaction for:[b]	Summary of effect
Fear (Q13-C)	[Frequency that fear crash when hear helicopters fly by] Never: -1.7 (N=219) Occasionally: 2.4 (N=49) Sometimes, Usually: 5.1 (N=57)	The most fearful are the equivalent of 6.8 dB* more annoyed than least
Importance (Q14b-C)	[How important do you feel that those helicopter flights are?] Very: -1.1 (N=208) Somewhat: 1.9 (N=95) A little, not at all: 2.4 (N=21)	Those saying "very" important are the equivalent of 3.5 dB* less annoyed than least
Preventablilty (Q14c-C)	[Extent to which pilots or other authorities could reduce the helicopter noise] Not at all: -1.6 (N=201) A little/ don't know: -1.4 (N=36) Somewhat: 2.7 (N=47) A lot: 6.2 (N=42)	Those believing "a lot" can be done are the equivalent of 7.8 dB* more annoyed than "not at all"
Annoyance with cars (Q5-I)	[Annoyance by cars around home] Not at all: -1.8 (N=109) Slightly: -0.6 (N=129) Moderately: 2.1 (N=65) Extremely: 4.9 (N=29)	"Very" annoyed by cars are the equivalent of 6.7 dB* more annoyed than "not at all"
Neighborhood rating (Q3-I)	[Rating of neighborhood as a place to live] Excellent: -0.2 (N=141) Good: -0.3 (N=169) Fair/Poor: 3.4 (N=22)	Those rating "excellant" are the equivalent of 3.6 dB* less annoyed than "fair/poor"

* Significant $p<.05$ level
NS - Not Significant for $p<.05$ test
a,b. (See footnotes in table V.)

TABLE VII. - RELATION BETWEEN ACTIVITY PATTERNS DURING STUDY DAY AND REACTIONS TO HELICOPTER NOISE

Characteristic (Question number	Deviation from mean reaction for[a]	Summary of effect
Sleeping (Q2-Repeated telephone questionnaire)	[Relation of nap to planned flight on study day] Flight during nap/sleep: 1.2 (N=176) No flight during sleep: -0.1 (N=4002)	Those taking nap are the equivalent of 1.3 dB [NS] more annoyed
Respondent location and window position (Q1,Q3-Repeated telephone)	[Number of decibels reduced by windows and location at home] 0-4: 2.7 (N=341) 5-0: 0.1 (N=85) 10-14: 1.7 (N=1543) 15-19: -1.0 (N=687) 20: -1.9 (N=1522)	Those in locations with reductions of 20 decibels are the equivalent of 4.6 dB *[b] less annoyed than those in locations with reductions of 0-4 decibels.

* Significant at $p<.05$ level
NS - Not Significant for $p<.05$ test
a. (See footnote b table V.)

b. This significance test is based on the bootstrap sampling error computation technique, (see appendix I) not on simple random sampling assumptions for a sample size of 4178. Annoyance was also regressed on (a) the individualized exterior noise level and (b) the reduction in decibels to be expected from the location of the respondent and the window positions on the day. From this regression it is estimated that each 3 dB reduction in noise due to location or window position is equivalent to only a 1 dB reduction at the exterior of the house.

TABLE VIII. - RELATION BETWEEN STUDY DESIGN FEATURES AND REACTIONS TO HELICOPTER NOISE

Characteristic (Question Number)[a]	Deviation from mean reaction for:[b]	Summary of effect
Knowing that neighbors in study (Q18-C)	[Does the respondent know if any neighbors are being repeatedly interviewed in this study?] Not know: 0.0 (N=232) Know neighbors are in study: 0.3 (N=85)	Those knowing neighbor in study are the equivalent of 0.3 dB [NS] more annoyed
Talking to neighbors about study (Q19-C)	[Have neighbors ever talked to respondent about study?] No: -0.2 (N=239) Yes-talked: 0.6 (N=90)	Those talking about study are the equivalent of 0.8 dB [NS] more annoyed
Time at Home (Q8-C)	[How typical was interviewing period in terms of amount of time spent at home?] Less time at home: 0.5 (N=42) Usual: -0.3 (N=235) More time at home: 0.8 (N=52)	Those at home more are the equivalent of 0.3 dB [NS] more annoyed than those at home less
Feeling about honorarium (Q22-C)	[Was the honorarium to the respondent:] Too much money: 1.3 (N=66) About right: -0.5 (N=235) Too little: 1.3 (N=25)	Those saying honorarium is right are the equivalent of 1.8 dB [NS] less annoyed
Perception of study goals (Q21-C)	[Does the respondent think the study is about:] All types of noise: -0.2 (N=241) Not know: -0.7 (N=24) Aircraft generally: -2.5 (N=35) Jet aircraft: 0.6 (N=9)	Those saying "air end" are the equivalent of 2.3 dB [NS] more annoyed than all types
Effect of interviewing on noticing noise (Q11-C)	[Has interviewing made you notice noise more?] Not notice more: -0.5 (N=79) Notice more: 0.1 (N=248)	Those noticing noise more are the equivalent of 0.6 dB [NS] more annoyed
Effect of interviewing on being bothered by noise (Q12-C)	[How has interviewing affected how you feel about noise?] About same or less bothered: -0.4 (N=287) More bothered: 2.6 (N=40)	Those feeling more bothered are the equivalent of 3.0 dB [NS] more annoyed
Number of days elapsed in telephone period	[Number of days since first telephone interview[c]] 7-9: -1.4 (N=487) 13-15: 0.3 (N=720) 20-23: 1.2 (N=762) 34-36: 0.8 (N=704) 41-44: 0.1 (N=774) 49-55: -1.4 (N=731)	Interviews at 20-23 days are the equivalent of 2.6 dB ** more annoyed than at beginning or end

TABLE VIII (continued)

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* Significant at $p<0.5$ level
NS - Not Significant for $p<0.5$ test
a,b. (see footnote in Table V)

c. Only three respondents thought that the study was about helicopter noise; this is too few to provide accurate estimates.

d. The first telephone interview was conducted on day number 1.

e. This significance test is based on the bootstrap sampling error computation method described in appendix I.

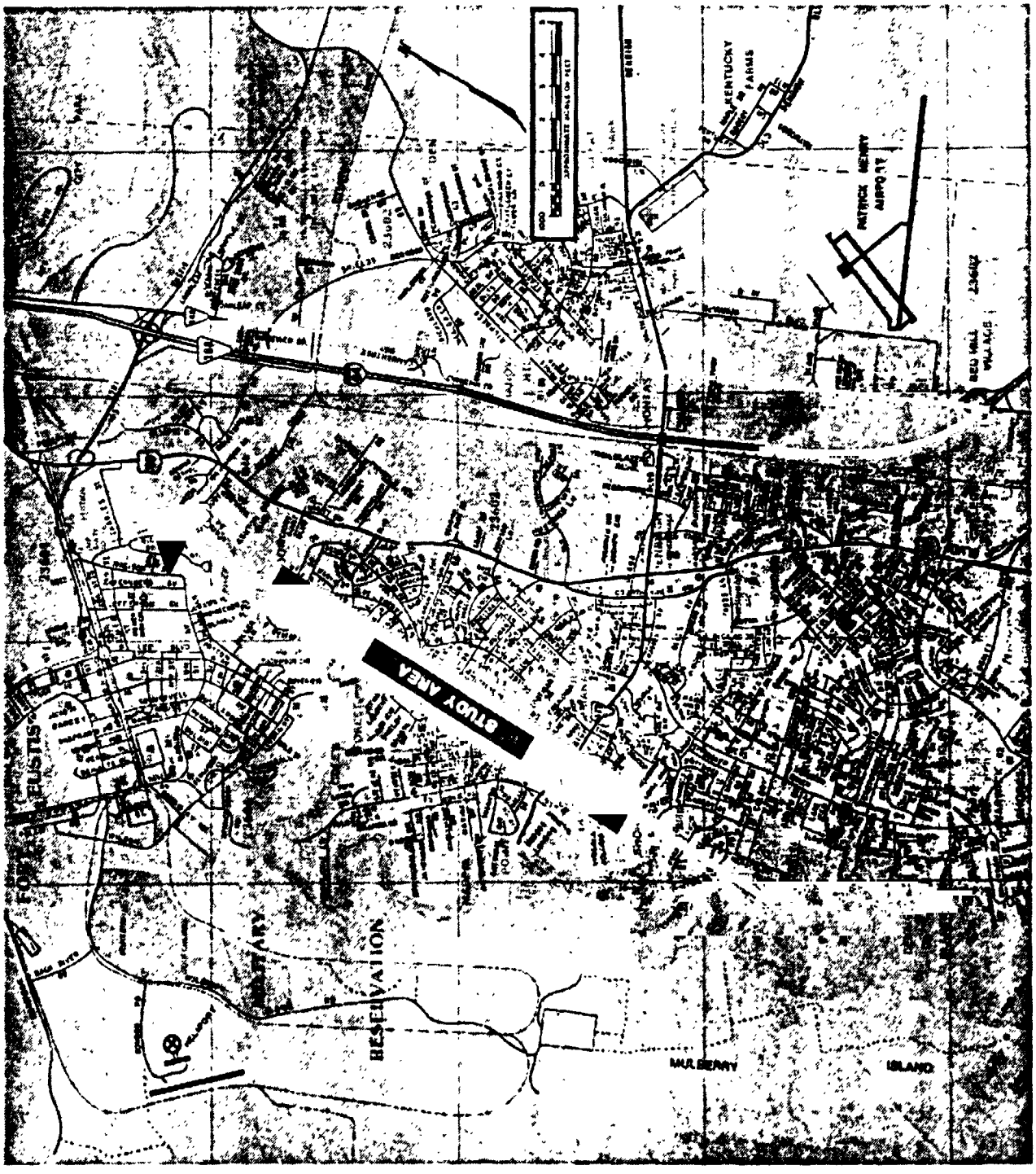
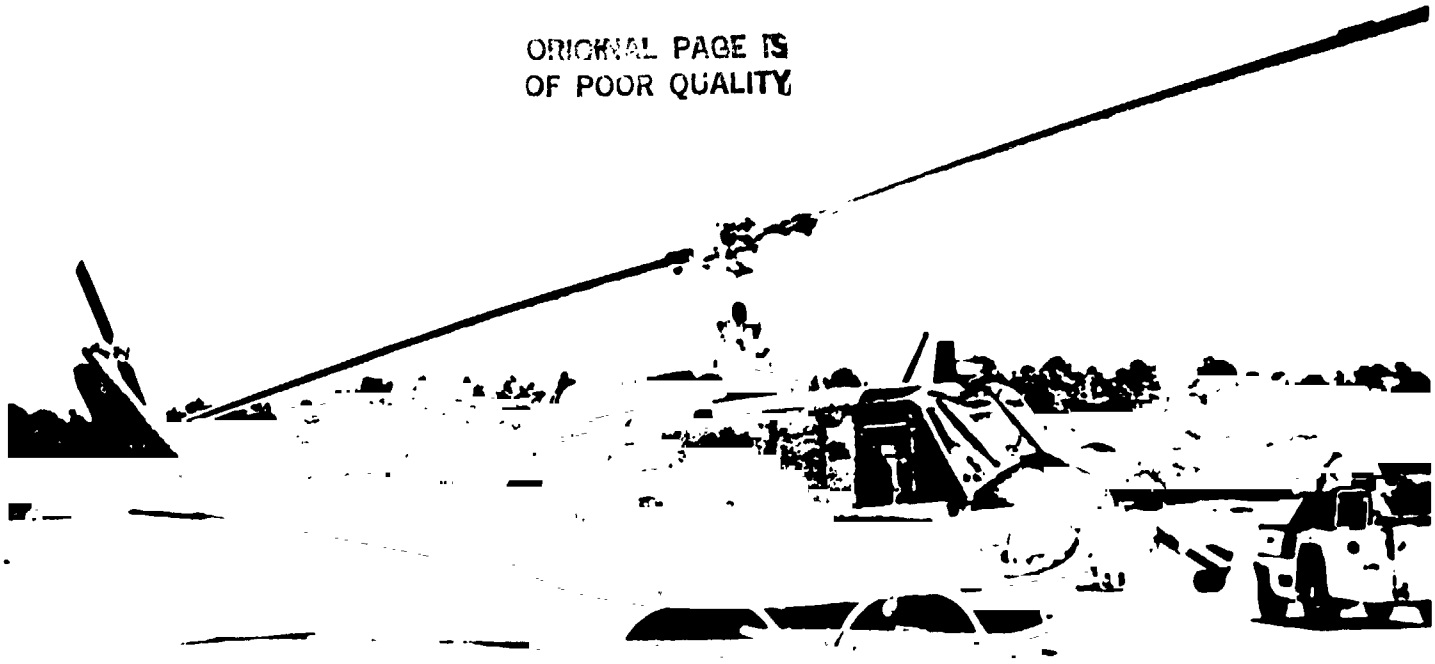
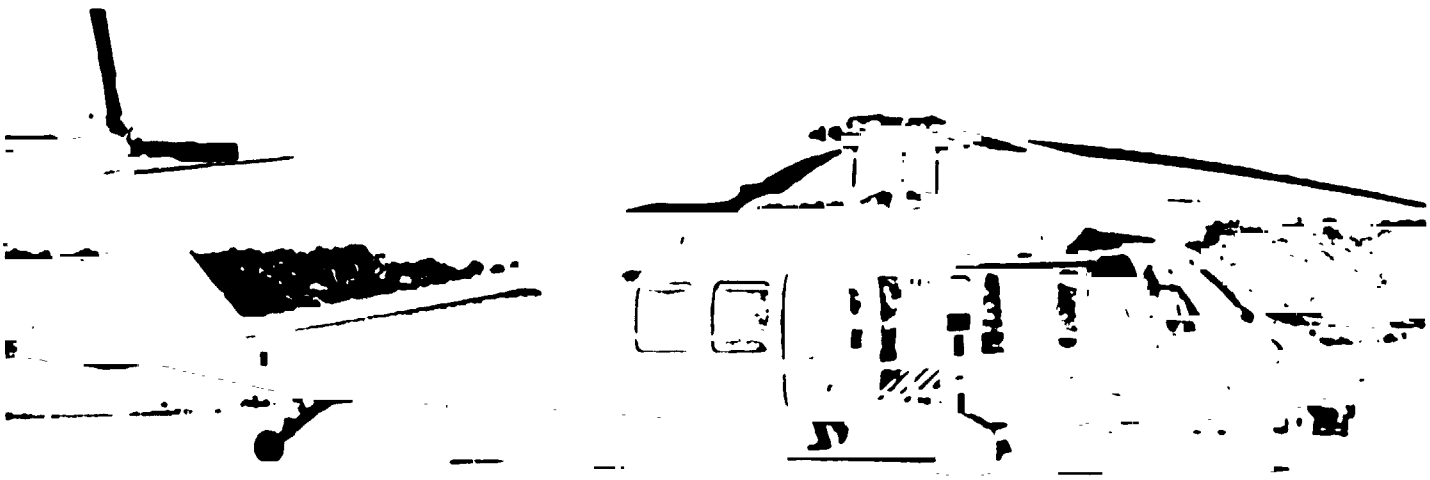


Figure 1. - Map of area with study area and flight path



UH-1H (Relatively impulsive type)



UH-60A (Less impulsive type)

Figure 2. - Types of helicopters used in the study

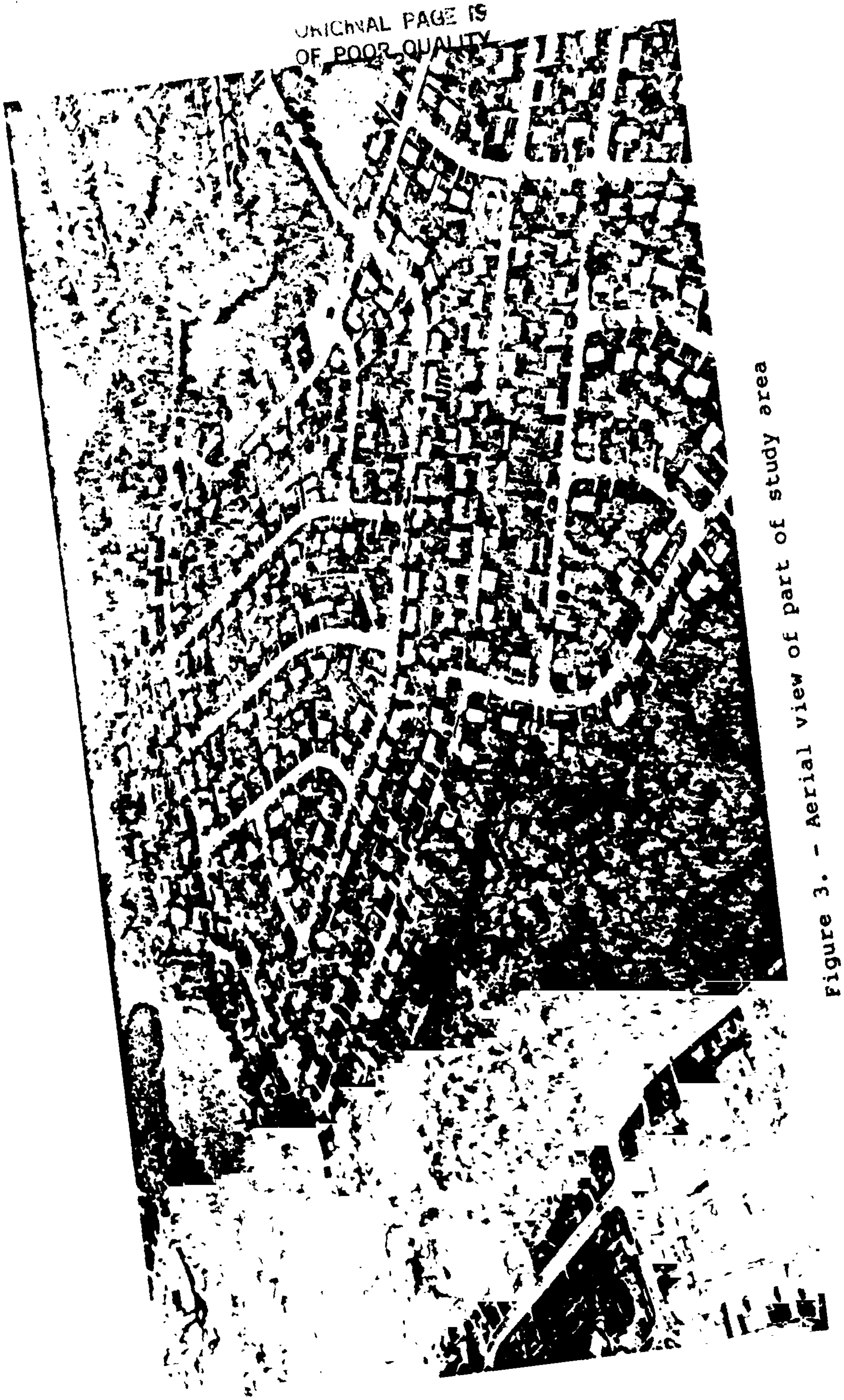


Figure 3. - Aerial view of part of study area

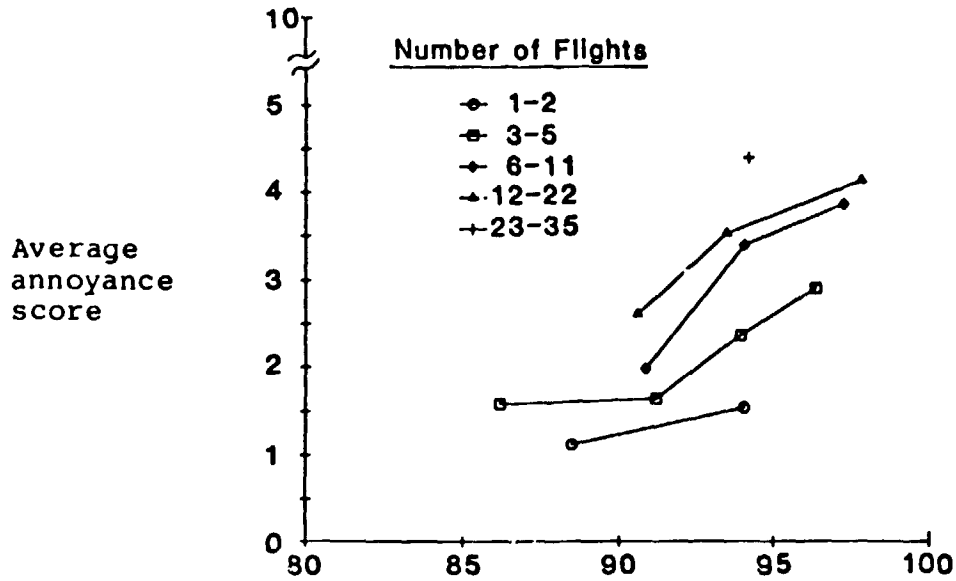


Figure 4. - Effect of noise level and number of flights on annoyance

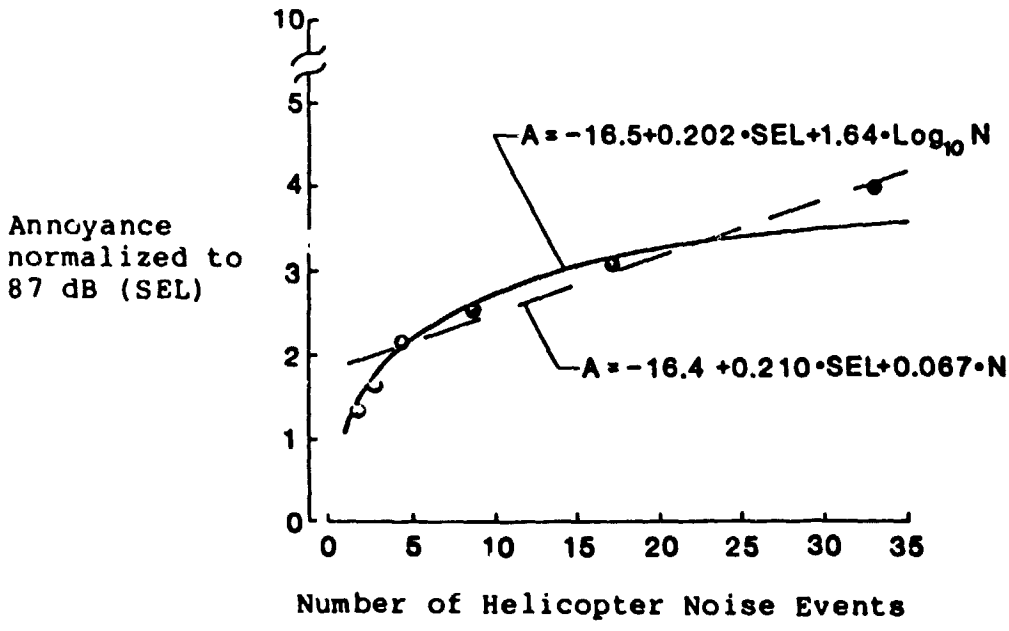


Figure 5. - The relationship of annoyance with number of noise events

(The data points come from dummy variable regression coefficients for 6 number-of-event groups)

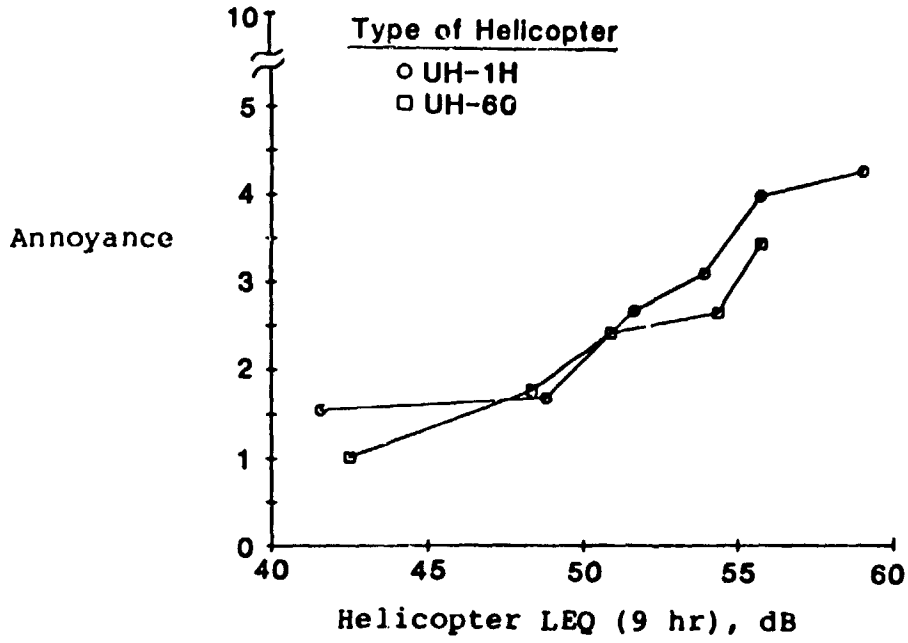
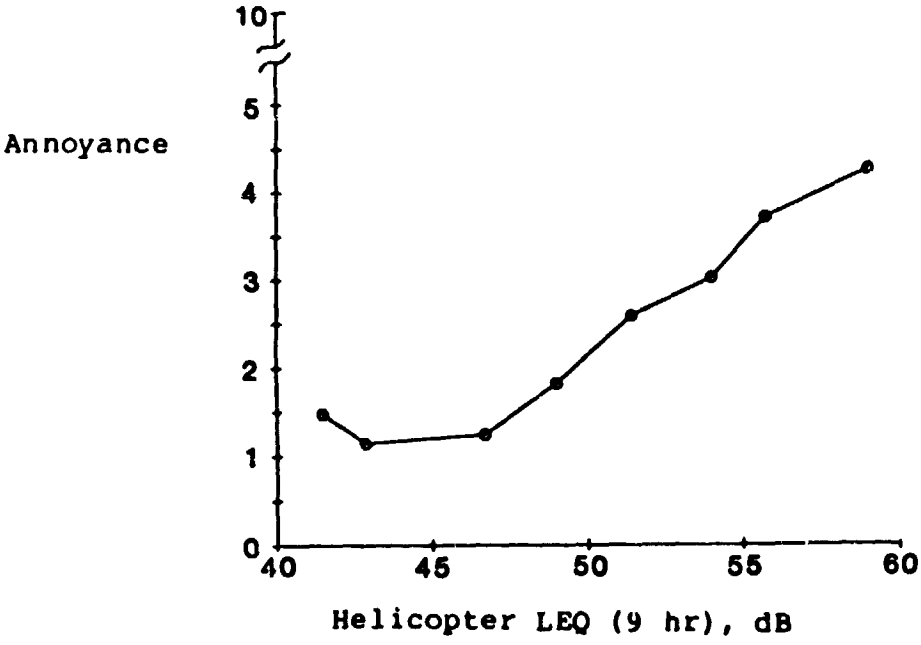


Figure 6. - Comparison of reactions to two types of helicopters



(Number of Interviews) (226) (121) (1181) (597) (192) (650) (826) (345)

Figure 7. - Relation between annoyance and LEQ

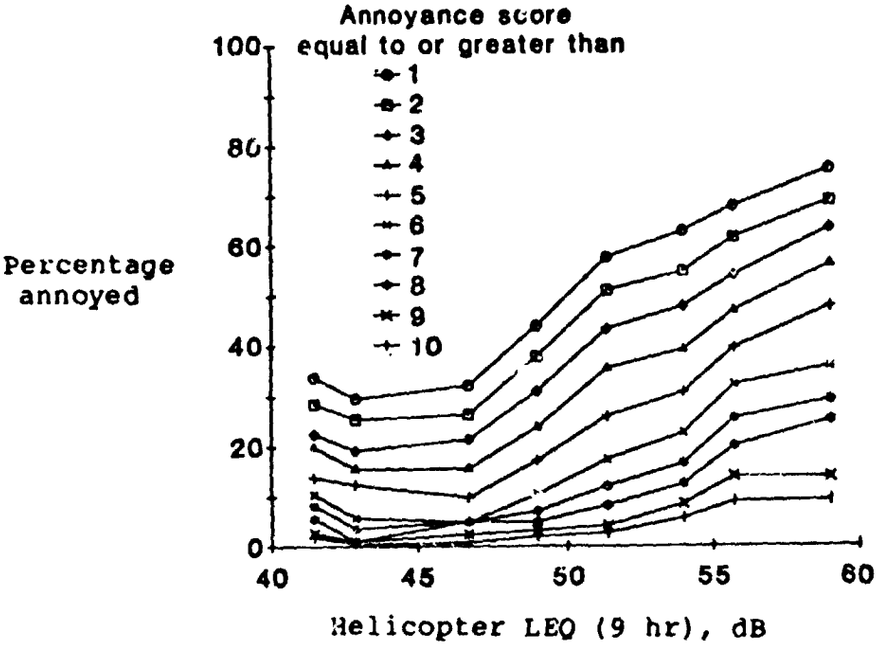


Figure 8. - Ten dichotomizations of the annoyance scale

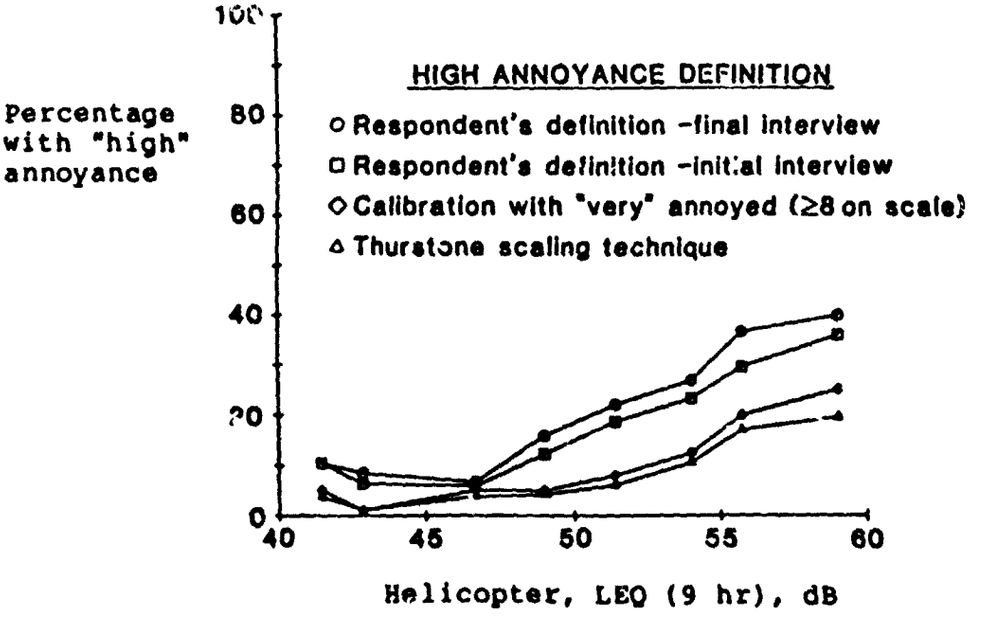


Figure 9. - Comparison of high annoyance definitions

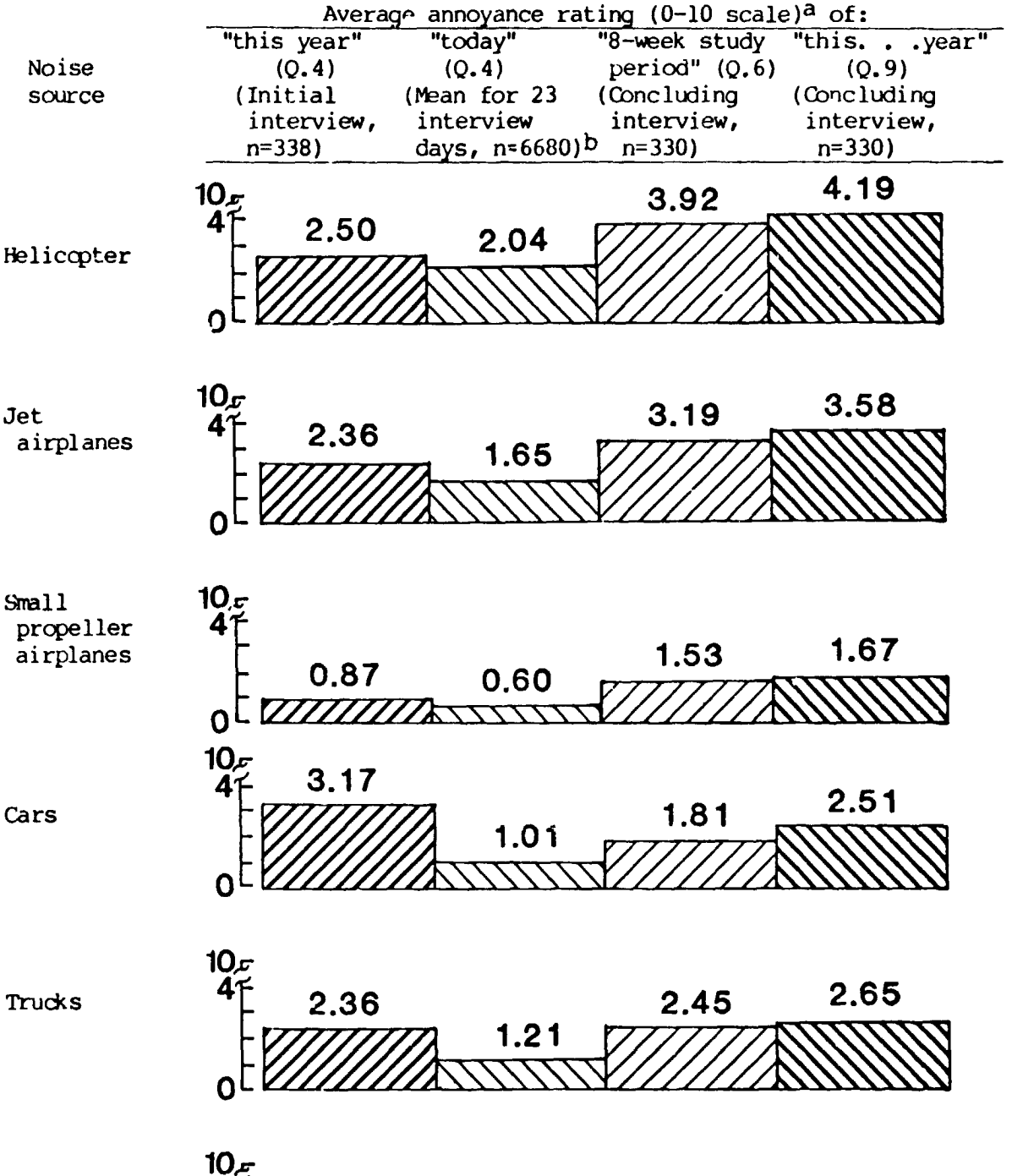


Figure 10. - Short-term and long-term ratings of six noise sources

[a] If a noise is reported as "not heard" it is scored zero.
[b] Excludes interviews when the respondent is absent the entire 8 a.m. to 5 p.m. day.

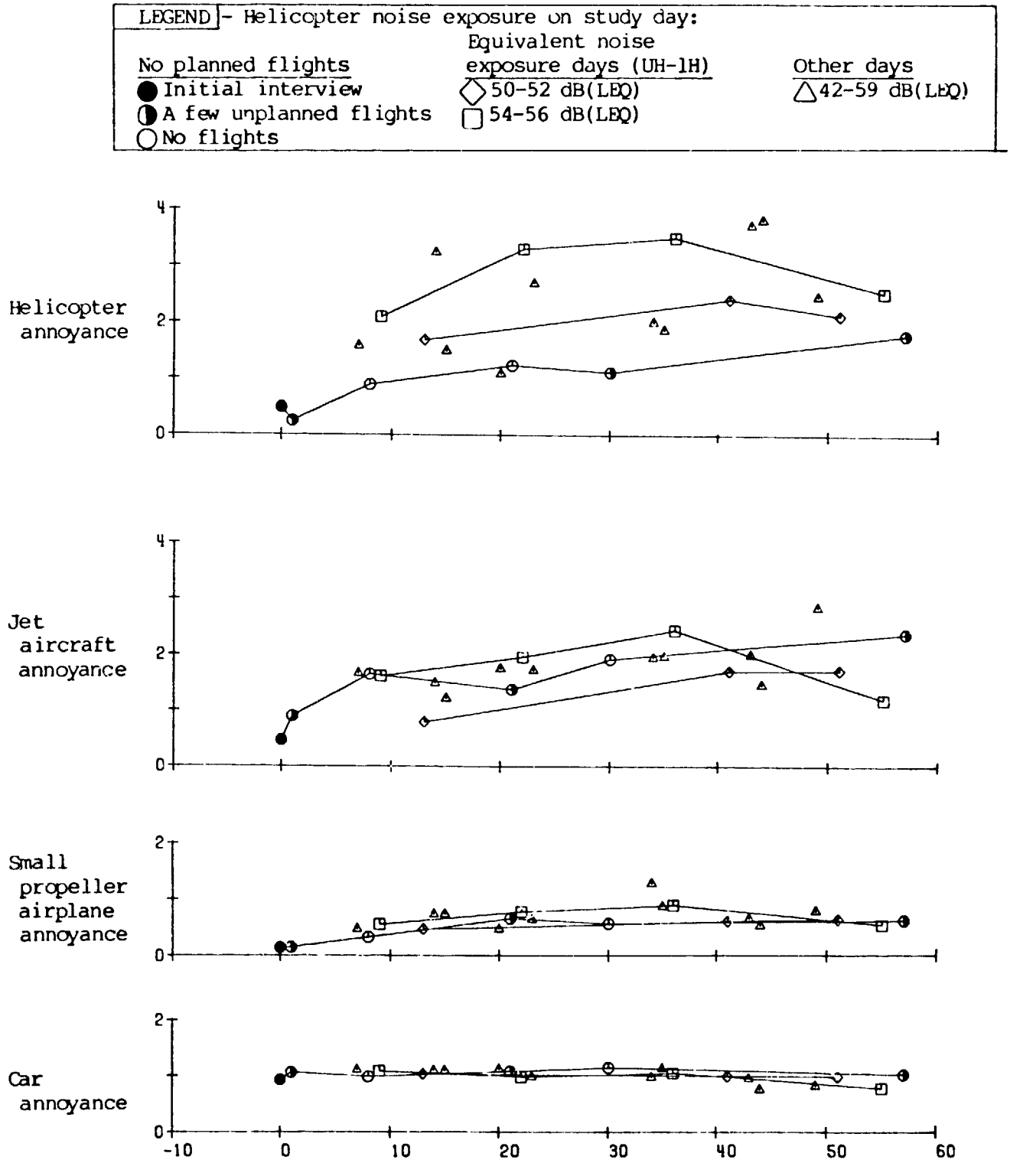


Figure 11: Annoyance (0 to 10 scale) with four noise sources by number of days elapsed in study (Day 1 is first telephone call-back)

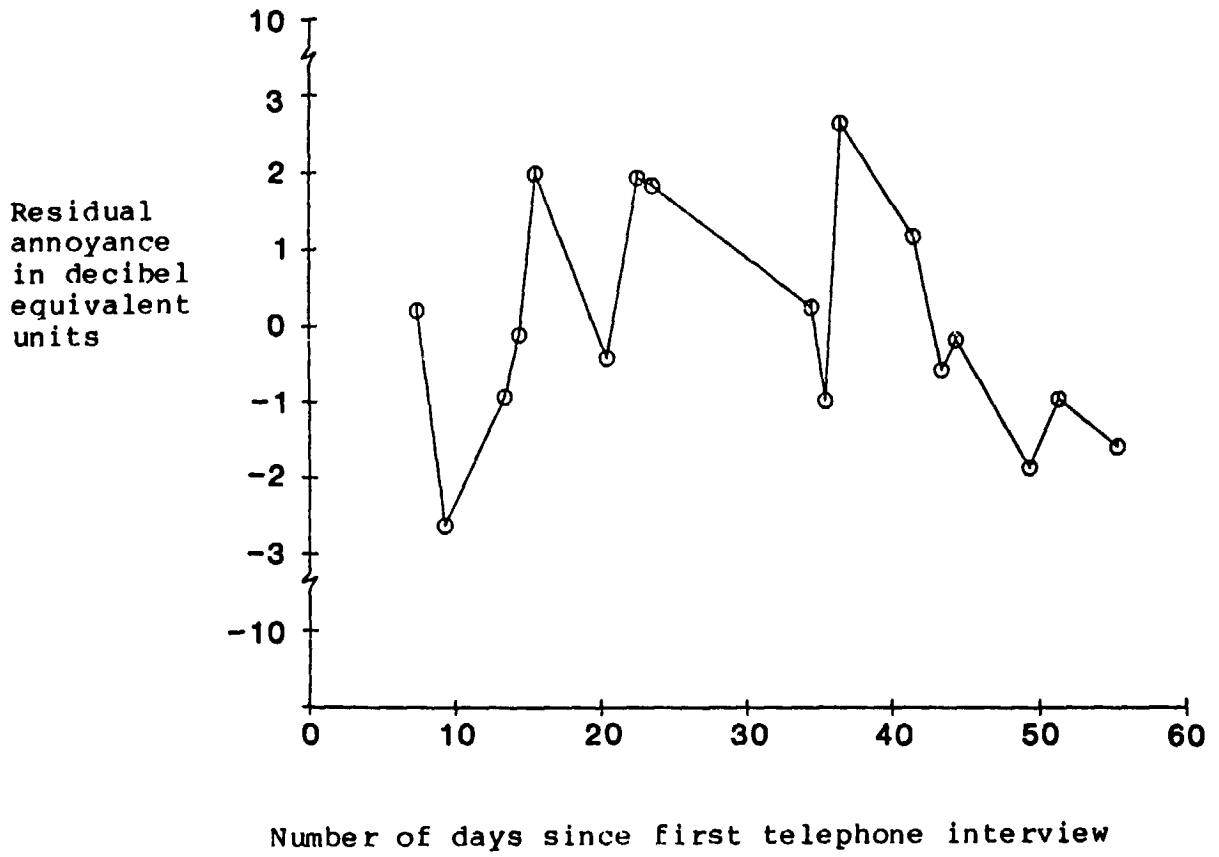


Figure 12. - Residual helicopter annoyance scores for 17 controlled noise exposure days.

APPENDIX A:

STUDY DAY INFORMATION

Table A-1- DAILY SCHEDULE AND INTERVIEW INFORMATION

Social survey day	Days elapsed in telephone survey period	Date[a]	Week	Day of week	Type of questionnaire	Controlled helicopter exposure day	Mean annoyance score (number of respondents)	
							At home part of day	At home for at least one planned flight
1	< 1	8/30-9/13	<1		Initial face-to face	No	0.49 (338)	--
2	1	9/14	1	W		No	0.25 (304)	--
3	7	9/20	2	Tu		Yes	1.58 (305)	1.98 (205)
4	8	9/21	2	W		No	0.89 (297)	--
5	9	9/22	2	Th		Yes	2.09 (286)	2.09 (282)
6	13	9/26	3	M		Yes	1.69 (288)	1.82 (260)
7	14	9/27	3	Tu		Yes	3.24 (298)	3.48 (238)
8	15	9/28	3	W		Yes	1.49 (295)	1.63 (222)
9	20	10/3	4	M		Yes	1.09 (292)	1.05 (225)
10	21	10/4	4	Tu	Repeated telephone (Core questionnaire)	No	1.24 (287)	--
11	22	10/5	4	W		Yes	3.31 (293)	3.33 (291)
12	23	10/6	4	Th		Yes	2.70 (269)	2.81 (246)
13	30	10/13	5	Th		No	1.12 (279)	--
14	34	10/17	6	M		Yes	2.01 (284)	2.25 (231)
15	35	10/18	6	Tu		Yes	1.88 (280)	2.22 (219)
16	36	10/19	6	W		Yes	3.52 (283)	3.82 (254)
17	41	10/24	7	M		Yes	2.42 (287)	2.89 (223)
18	43	10/26	7	W		Yes	3.74 (286)	3.81 (275)
19	44	10/27	7	Th		Yes	3.83 (281)	3.89 (276)
20	49	11/1	8	Tu		Yes	2.48 (283)	2.75 (229)
21	51	11/3	8	Th		Yes	2.13 (282)	2.42 (228)
22	55	11/7	9	M	Core Q.+ 24 hr question	Yes	2.54 (288)	2.59 (274)
23	57+	11/9+[b]	9-11	W+	Concluding telephone	No	1.79 (298)	--

a. This is the date asked about in the interviews. Repeated telephone interviews were done on this date or on the following morning.
b. Most interviews were completed by 11/10/83 but the last interview was on 11/28/83.

Table A-II - Summary noise data for 17 sites
(all flights $\geq$ 60dB, LA are included)

Identification		Number of flights			Level ($\overline{LA}$) ($\log_{10}$ average) based on:		Helicopter type	
Social survey day	Site F = fixed M = Mobile[a]	Planned flights (N)	All flights (N)	% planned	Planned flights	All flights	Planned type I = impulsive N = non-impulsive	% of flights that are planned type
	F	2	6	33	80	76		67
3	M15	2	7	29	86	81	N	59
	M18	2	7	29	78	73		55
	F	8	23	35	76	74		83
5	M01	8	18	44	75	72	I	86
	M02	8	25	32	79	76		86
	F	5	14	36	71	70		88
6	M34	5	8	62	72	72	I	97
	M17	5	7	71	76	75		93
	F	8	23	35	83	80		37
7	M03	8	14	57	84	82	N	75
	M19	8	10	80	84	83		88
	F	1	7	14	70	69		86
8	M16	1	2	50	66	64	I	88
	M33	1	3	33	72	68		92
	F	2	2	100	74	74		100
9	M14	2	3	67	71	70	N	81
	M32	2	3	67	76	76		100
	F	6	12	50	79	77		90
11	M13	6	7	86	80	80	I	96
	M31	6	6	100	83	83		100
	F	4	11	36	76	74		80
12	M04	4	6	67	78	78	I	79
	M20	4	6	67	78	79		67
	F	2	6	33	83	79		50
14	M06	2	4	50	88	85	N	71
	M22	2	4	50	84	81		50
	F	8	10	80	76	75		80
15	M12	8	8	100	77	77	N	100
	M30	8	8	100	76	76		100
	F	15	18	83	76	76		94
16	M17	15	15	100	75	75	I	100
	M29	15	16	94	78	79		94
	F	2	4	50	82	83		75
17	M11	2	4	50	80	77	I	88
	M29	2	3	67	81	81		67
	F	7	11	64	83	81		91
18	M08	7	17	41	84	81	I	85
	M24	7	11	64	85	83		64

Table A-II (continued)

Identification		Number of flights			Level ($\overline{LA}$) ($\log_{10}$ average) based on:		Helicopter type	
Social survey day	Site F = fixed M = Mobile[a]	Planned flights (N)	All flights (N)	% planned	Planned flights	All flights	Planned type I = impulsive N = non-impulsive	% of flights that are planned type
	F	32	35	91	80	79		99
19	M10	32	37	86	78	77	I	97
	M28	32	32	100	79	79		100
	F	8	24	33	82	78		71
20	M35	8	19	42	81	78	N	66
	M25	8	11	73	83	82		91
	F	10	14	71	73	72		100
21	M09	10	24	42	74	71	I	85
	M27	10	11	91	75	75		100
	F	20	21	95	75	75		100
22	M36	20	24	83	74	73	I	96
	M26	20	50	100	76	76		100

a. Mobile sites are numbered from south to north.

Table A-III - Noise data for 17 days

Social survey day	Number of flights (averaged over 3 sites)			Level ($\overline{LA}$)[a] based on:		Helicopter type		Helicopter LEQ (9 hr)[a] for helicopter[c] types		
	Planned flights (N)	All flights (N)	% planned	Planned flights	All flights	Planned type I = impulsive N = non-impulsive	Average % of flights that are planned type	All flights	Impulsive	Non-impulsive
1	Initial face-to-face interviews conducted. Noise measurement team not in the field during this period.									
2	First repeated telephone interviews conducted. Noise measurement team not in the field on this day.									
3	2	7	30	77	77	N	60	49	41	49
4	Noise measurement team in field, but no flights due to bad weather.									
5	8	22	36	74	74	I	85	54	54	44
6	5	10	52	73	72	I	92	50	50	37
7		16	51	82	82	N	67	56	47	56
8	1	4	25	67	66	I	88	42	43	27
9	2	3	75	73	73	N	94	43	25[d]	43
10	Noise measurement team in field. No planned flights, but an average of four unplanned flights per site.									
11	6	8	72	80	80	I	95	54	54	35
12	4	8	52	77	77	I	75	52	51	43
13	Noise measurement team in field, but no flights due to bad weather.									
14	2	5	43	82	82	N	57	50	33	50
15	8	9	92	76	76	N	93	52	31	51
16	15	16	92	76	76	I	96	55	55	47
17	2	4	55	80	80	I	76	52	51	44
18	7	13	54	82	82	I	80	59	60	42
19	32	35	92	78	78	I	99	59	60	29[d]
20	8	18	44	79	79	N	76	55	38	55
21	10	16	61	72	72	I	95	52	53	29[d]
22	20	22	92	75	75	I	98	54	55	26[d]
23	Noise measurement team in place until five p.m. Two flights at ten minutes after five p.m.									

a. These noise levels are the arithmetic average of the average levels calculated for each site. The average levels from each site are logarithmic averages.

b. The percentage is calculated for each site and then averaged across the three sites.

c. The value of LEQ for the individual helicopter type is sometimes 1 dB below that for all helicopters because the value of SEL used in the helicopter type LEQ is based on only the helicopter flights that could definitely be identified at a particular site.

d. This is the noise level for helicopters which were not classified by type for this day because no helicopters were definitely identified as being of this type on this day.

APPENDIX B:

FIELD WORK DOCUMENTS

Respondent Recruitment Letter

the bionetics corporation

20 RESEARCH DRIVE
HAMPTON, VIRGINIA 23666
TELEPHONE (804) 865-0880

24 August 1983

Dear Resident:

Information on people's opinions about their neighborhood environments is needed by the United States Department of Transportation. The Bionetics Corporation has been selected to carry out a survey in your area to provide this information. The opinions of people in your household are being sought for this study.

Information collected in this study will be valuable for setting general national policies. It will not be used in local planning. The interviews will be strictly confidential. Results of the study will only be presented in statistical tables in which neither the individuals nor neighborhoods will be identified. The data collection procedure has been approved by the Office of Management and Budget (OMB No. 2120-0503).

Our interviewer will contact you within the next ten days. It will be appreciated if you can give our representative every assistance possible.

Sincerely,

J. M. Fields

J. M. Fields, Ph.D.
Research Sociologist
Bionetics Corporation

Respondent Selection Sheet and Call-Back Form

(Call-back form is on reverse side of Selection Sheet)

OMB No. 2120-0503

STREET ADDRESS _____ RESPONDENT SELECTION SHEET SAMPLE ID [8 9 10] [11 12]

DISPOSITION [12 13] ELIGIBLE [14] NUMBER OF CALLS [15 16]

Hello. My name is . . . .from Bionetics. You probably received a letter recently about an opinion survey which we are doing for the Department of Transportation on how people feel about their neighborhood environment. We want to find out how you feel about the environment in this area. I would like to ask you a few questions if I could come in. (GO IN IF POSSIBLE)

As I mentioned we have several questions for you. You are not required to provide the information but it will be very helpful if you can help us.

First we need to know the number of adults, that is people over 18, who presently live in this house. We do not need to know their names, just their relationship to you.

(LIST ALL RELATIONSHIPS THEN ASK FOR EACH)

A. Is/Are (you/ relation) ... usually at home during the daytime on weekdays?
(ASK ABOUT EACH PERSON BEFORE GOING TO B.) [ELIGIBLE IF USUALLY HOME 2 WEEKDAY (M - Th) MORNINGS]
NOTE: WHEN PERSON FOUND TO BE INELIGIBLE THEN CIRCLE REASON, ALSO CIRCLE "NO" IN ELIGIBLE BOX, AND ASK NO MORE QUESTIONS ABOUT PERSON

B. Do you know of anything that will mean that ..(READ ELIGIBLE).. will not be at home during the daytime on most weekdays for the next 4 or 5 weeks?

C. Are/Is ..(READ ELIGIBLE) .. normally up during the day or is/are ... a night worker who usually sleeps during the day?

D. (RECORD INFORMANT'S HEARING BY OBSERVATION, ASK ABOUT OTHERS WHO ARE STILL ELIGIBLE)
Does..(READ ELIGIBLE)..have normal hearing or does he/she have a severe hearing problem so that it is often difficult to hear normal conversation?

	RELATIONSHIP TO INFORMANT	SELECTED	OUTCOME OF ELIGIBILITY	ELIGIBILITY CRITERIA A. USUALLY AT HOME	B. NEXT WEEKS AT HOME	C. DAY SLEEP	D. HEARING
1.	INFORMANT		1. YES 2. NO	1. YES 2. NO = STOP	1. AT HOME 2. NOT AT HOME=STOP	1. NO 2. SLEEP = STOP	1. NORMAL 2. PROBLEM = STOP
2.			1. YES 2. NO	1. YES 2. NO = STOP	1. AT HOME 2. NOT AT HOME=STOP	1. NO 2. SLEEP = STOP	1. NORMAL 2. PROBLEM = STOP
3.			1. YES 2. NO	1. YES 2. NO = STOP	1. AT HOME 2. NOT AT HOME=STOP	1. NO 2. SLEEP = STOP	1. NORMAL 2. PROBLEM = STOP
4.			1. YES 2. NO	1. YES 2. NO = STOP	1. AT HOME 2. NOT AT HOME=STOP	1. NO 2. SLEEP = STOP	1. NORMAL 2. PROBLEM = STOP
5.			1. YES 2. NO	1. YES 2. NO = STOP	1. AT HOME 2. NOT AT HOME=STOP	1. NO 2. SLEEP = STOP	1. NORMAL 2. PROBLEM = STOP

COUNT NUMBER ELIGIBLE FROM GRID

0. NONE → That is all I need. Thank you for your help.

1. ONLY ONE PERSON →

2. TWO OR MORE → SELECT PERSON FIRST IN ALPHABETICAL ORDER BY FIRST INITIAL

CONTINUE INTERVIEW IF SELECTED THIS INFORMANT. MAKE APPOINTMENT IF SELECTED RESPONDENT NOT AT HOME

CALL BACK AND FACE SHEET DISPOSITION RECORD

RECORD OF CALLS

Call #	Call by (Int ID)	Time of Call: No/Day 8 Aug 9 Sep	Day of Week S M T W T F S	Time AM	Time PM	OUTCOME OF CALL: Further Visit Required: No Contact	Contact at Address: No Sample Info	Eligible person but: Not Contacted	Eligible person but: Contact No Int	Suggest return at (day & time	Address Completed	Comments (Include information from neighbors)
1		/	S M T W T F S	:	:	1	2	3	4		5	
2		/	S M T W T F S	:	:	1	2	3	4		5	
3		/	S M T W T F S	:	:	1	2	3	4		5	
4		/	S M T W T F S	:	:	1	2	3	4		5	
5		/	S M T W T F S	:	:	1	2	3	4		5	
6		/	S M T W T F S	:	:	1	2	3	4		5	
7		/	S M T W T F S	:	:	1	2	3	4		5	
8		/	S M T W T F S	:	:	1	2	3	4		5	
9		/	S M T W T F S	:	:	1	2	3	4		5	
10		/	S M T W T F S	:	:	1	2	3	4		5	
11		/	S M T W T F S	:	:	1	2	3	4		5	
12		/	S M T W T F S	:	:	1	2	3	4		5	
13		/	S M T W T F S	:	:	1	2	3	4		5	
14		/	S M T W T F S	:	:	1	2	3	4		5	
15		/	S M T W T F S	:	:	1	2	3	4		5	
16		/	S M T W T F S	:	:	1	2	3	4		5	
17		/	S M T W T F S	:	:	1	2	3	4		5	

FINAL DISPOSITION (Circle correct answer and record in box 13-14)

1. No Contact
INELIGIBLE: 2. No address 3. House Vacant 4. Occupants not meet selection criteria 5. Other_____
REFUSAL : 6. Selected person but refuses 7. Refuse selection information
INTERVIEW : 8. Not agree to follow up 9. Agree to follow up
10. OTHER (Describe)

ELIGIBILITY: Does there appear to be an eligible person at address? 1. Yes 2. No (Circle if no interview. Record in box 15)

COMMENTS: Provide any additional information about unsuccessful disposition.

Face-to-Face Initial Questionnaire

dot-face-q R8

Approved for use through 04/30/85
O.M.B. No. 2120-0503

SAMPLE ID □□□ - □□

ENVIRONMENT SURVEY

ENVIRONMENT SURVEY dot-face-q R8
Approved for use through 04/30/85
O.M.B. No. 2120-0503

FIRST CARD
I
1 2 3 4 5

(OFFICE INTERVIEW ID) ☐☐☐-☐☐
6 7
☐☐

SAMPLE ID ☐☐☐ - ☐☐ (8-12)

INTERVIEWER ID ☐☐ (13-14)

YOUR INTERVIEW NO. ☐☐ (15-16)

We want to find out about the environment around here and how you feel about it over the next few weeks.

Q1 How do you feel about this area, the block or so right around here? What are the things you like most about this area, that is, the things you feel are advantages and make it a good place to live?

START TIME ☐☐☐☐ (17-20)

21 22
☐☐
23 24
☐☐

Q2 Are there any things you particularly dislike about this area, that is things which are disadvantages?
(RECORD ANSWERS, RECORD ALL PHRASES DESCRIBING ENVIRONMENTAL NUISANCES VERBATIM)

25 26
☐☐
27 28
☐☐
29 30
☐☐
31 32
☐☐

33-78 SKP
79 80
1 1

SECOND CARD
II
1-5 DUP
6 7
0 2

Q3 Taking everything into consideration, how would you rate this neighborhood as a place to live? Would you say it is excellent, good, fair, or poor?
1 EXCELLENT
2 GOOD
3 FAIR
4 POOR

8-16 SKP

(17)

SECOND CARD II

In a moment I will ask you to rate some of the sounds around here using this scale (SHOW CARD A). Any sound can be rated somewhere between 0, if you are "not at all annoyed," to 10 if you are "extremely annoyed", that is the more annoyed, the bigger the number. If you have never heard some sound around here tell me, but if you ever hear it, rate it somewhere from zero to ten on this scale. When you rate a sound take into account both how often you hear and how much it bothers you when you do hear it.

Q4 Thinking about this last year, how do you feel about the sounds from ...(cars)... around here? How much do they bother or annoy you?

	RATING	DO NOT HEAR	
a. Cars	☐☐	20	(18-19)
b. Trucks	☐☐	20	(20-21)
c. Motorcycles	☐☐	20	(22-23)
d. Jet airplanes	☐☐	20	(24-25)
e. Helicopters	☐☐	20	(26-27)
f. Small propeller airplanes	☐☐	20	(28-29)
g. Neighbors' tools or yard equipment	☐☐	20	(30-31)
h. Are there any other noises which bother or annoy you around here? (DESCRIBE ALL. IF MORE THAN ONE CIRCLE MOST ANNOYING AND RATE IN "i") _____		20 (NONE)	
_____			(32-33)
i. IF YES How much does it bother or annoy you?	☐☐		34 35 36 37 ☐☐☐☐

38-39 SKP

Q5 Please look at this card (SHOW CARD B) and tell me how annoying the noise from cars is around here. Would you say the noise from cars was not at all annoying, slightly annoying, moderately annoying, very annoying, or extremely annoying?

1 NOT AT ALL
2 SLIGHTLY
3 MODERATELY
4 VERY
5 EXTREMELY

(40)

SECOND CARD II

The next questions are about where you spend your time.

IF BEFORE 5 PM OR WEEKEND CIRCLE "4" AND ASK "a".

Q6 Were you at home most of the day today?

2. YES (ASK Q7-Q10 ABOUT TODAY)	3. NO 4. BEFORE 5 PM OR WEEKEND	(41)
	a. What was the most recent weekday you were at home most of the day?	
	i. DAY OF WEEK: 1.M 2.Tu 3.W 4.Th 5.F	(42)
	ii. WEEK 1. THIS WEEK 2. LAST WEEK 3. BEFORE LAST WEEK	(43)
	IF BEFORE LAST WEEK: MONTH _____ DATE _____	44 45 46 47
	(ASK Q7-Q10 ABOUT THAT DAY)	

48-78 SKP
79-80 DUP

Q7 We need to find out whether you were around home ... (yesterday) ... from 8:00 in the morning until 5:00 in the afternoon. Starting at 8:00 were you at home or away from home?

THIRD CARD III

1-5 DUP

6 7

(1) DO NOT RECORD EVENTS OF LESS THAN 10 MINUTES AS A SEPARATE EPISODE (2) COUNT TIME SPENT AT NEARBY NEIGHBORS (within 3 houses) AS "TIME AROUND HOME"

REPEAT FROM HERE FOR EACH EPISODE. RECORD FIRST EPISODE UNDER "EPISODE 1"

a. So at ...(8:00) ...you were ...

1 Away from home

b. What time did you get back home?
RECORD IN "TIME END" BOX AND START NEW EPISODE

A. Around home (or at a neighbors)

c. Were you indoors or outdoors at ... (8:00) ... ?

2 OUTDOORS

d. What time did you then go back indoors or leave the area?
RECORD IN "TIME END" BOX AND START NEW EPISODE

3 INDOORS

e. Did you go outdoors or leave home (again) later in the day?

A. NO	B. YES f. What time was that?
RECORD "5:00" IN "TIME END" BOX AND GO TO NEXT QUESTION	RECORD TIME IN "TIME END" BOX AND START NEW EPISODE

THIRD CARD III

	TIME BEGIN		AROUND HOME		TIME END	
EPISODE 1	8:00	1. AWAY	2. OUTDOORS	3. INDOORS		(20) (21-24)
EPISODE 2	:	1. AWAY	2. OUTDOORS	3. INDOORS		(25) (26-29)
EPISODE 3	:	1. AWAY	2. OUTDOORS	3. INDOORS		(30) (31-34)
EPISODE 4	:	1. AWAY	2. OUTDOORS	3. INDOORS		(35) (36-39)
EPISODE 5	:	1. AWAY	2. OUTDOORS	3. INDOORS		(40) (41-44)
EPISODE 6	:	1. AWAY	2. OUTDOORS	3. INDOORS		(45) (46-49)
EPISODE 7	:	1. AWAY	2. OUTDOORS	3. INDOORS		(50) (51-54)
EPISODE 8	:	1. AWAY	2. OUTDOORS	3. INDOORS		(55) (56-59)
EPISODE 9	:	1. AWAY	2. OUTDOORS	3. INDOORS		(60) (61-64)
EPISODE 10	:	1. AWAY	2 OUTDOORS	3. INDOORS		(65) (66-69)

[IF MORE THAN 10 USE SUPPLEMENTAL PAGE AND CHECK HERE ☐]

THIRD CARD III

70-78 SKP

79 80 DUP

FOURTH CARD IV

1-5 DUP

6 7

0 4

Q8 Did you sleep or try to take a nap during the day?

1. YES

a. What time was that?

BEGIN: ☐☐☐☐ (9-12)

END : ☐☐☐☐ (13-16)

2. NO (8)

Q9 Did you have any of the windows open in your house ... (yesterday) ...?

YES - OPEN

a. In the rooms you were in were the windows open or closed most of the time?

3. MOSTLY OPEN
4. MOSTLY CLOSED

2. NO - ALL WERE CLOSED (17)

FOURTH CARD IV

Now we are going to use a zero to ten scale to rate some sounds you may have heard while you were at home ... (yesterday) [GIVE PEEL-OFF SCALE CARD]. Take into account both how many times you heard the sound ... (yesterday) ... and how much it bothered you when you did hear it. We only need to know about the sounds you heard in the morning and afternoon because the noise level measurements have only been made during the day.

Q10 When you were at home during the day ... (yesterday) ... how much were you bothered or annoyed by the noise from ... (cars) ...?

	RATING	NOT HEARD	
a. Cars	☐☐	20	(18-19)
b. Trucks	☐☐	20	(20-21)
c. Motorcycles	☐☐	20	(22-23)
d. Jet airplanes	☐☐	20	(24-25)
e. Helicopters	☐☐	20	(26-27)
f. Small propeller airplanes	☐☐	20	(28-29)
g. Neighbors' tools or yard equipment	☐☐	20	(30-31)
h. Is there any other noise which bothered or annoyed you around here ... yesterday ...? (DESCRIBE ALL. CIRCLE WORST)		20 (NONE)	(32-33)
_____			
i. IF YES How much did it bother you?	☐☐		34 35 36 37 ☐☐☐☐

38-78 SKP
79-80 DUP

FIFTH CARD
V
1-5 DUP
6 7
0 5

Q11 Let's look at that zero to 10 annoyance scale again: What is the lowest number you would use and still say you were "highly annoyed"? (8-9)

SCALE NUMBER ☐☐

Q12 What year did you move into this house? (10-11)

19 ☐☐

a. [IF 1983] What month did you move in? _____

Q13 Do you own this house or are you renting it? (12)
1. OWN (OR BUYING)
2. RENT

Q14 How many of the people in your household go out to work? ☐☐ (13-14)
(LIST RELATIONSHIP TO RESPONDENT BEFORE ASKING a)

a. Where do each of them work?

RELATION TO RESPONDENT	PLACES OF WORK (DO NOT READ)	
1. RESPONDENT 2. SPOUSE 3. CHILD 4. PARENTS 5. OTHER _____	1.SHIPYARD 2.FT. EUSTIS 3.PATRICK HENRY 4.LANGLEY AFB 5.NASA 6.OTHER (DESCRIBE) _____	(15)(16)
1. RESPONDENT 2. SPOUSE 3. CHILD 4. PARENTS 5. OTHER _____	1.SHIPYARD 2.FT. EUSTIS 3.PATRICK HENRY 4.LANGLEY AFB 5.NASA 6.OTHER (DESCRIBE) _____	(17)(18)
1. RESPONDENT 2. SPOUSE 3. CHILD 4. PARENTS 5. OTHER _____	1.SHIPYARD 2.FT. EUSTIS 3.PATRICK HENRY 4.LANGLEY AFB 5.NASA 6. OTHER (DESCRIBE) _____	(19)(20)

**********SKIP TO PAGE 9**********

FIFTH CARD V

*********SKIP********SKIP TO NEXT PAGE*********SKIP TO NEXT PAGE*********

RECORD THE FOLLOWING OBSERVATIONS AFTER INTERVIEW IS COMPLETED

Q21 SEX OF RESPONDENT

1. Male
2. Female

(21)

Q22 ESTIMATED AGE OF RESPONDENT

1. 18-29
2. 30-39
3. 40-49
4. 50-59
5. 60-69
6. 70 or more

(22)

Q23 DATE OF INTERVIEW: Month ☐☐ 8(Aug), 9(Sept) (23-24)

Day ☐☐ (25-26)

Q24 FACE SHEET INFORMATION: Number of Adults ☐☐ (27-28)

Number Eligible ☐☐ (29-30)

(Q16) TIME CHART INFORMATION:

Total hours away for 5 weekdays from 8 am-5 pm ☐☐ (31-32)

	33	34	35	36	37
A.M. HOME (9-12)	M	T	W	T	F
ALL	1	1	1	1	1
NONE	2	2	2	2	2
SOME	3	3	3	3	3

(33-37)

38-39 SKP

(Q20) TIME END ☐☐:☐☐ (40-43)

Q25 ACCURACY OF EPISODE TIME REPORTING [ACCURACY OF POOREST REPORT]

1. Within 5 minutes
2. Within 15 minutes
3. Within 30 minutes
4. Poorer than 30 minutes

(44)

Q26 IF MORE THAN 10 EPISODES RECORD NUMBER ☐☐ (45-46)

47-78 SKP

79-80 DUP

SAMPLE ID ☐☐☐ - ☐☐

This is the end of the interview. What we need now is to make arrangements to find out how you feel about the neighborhood on certain days in September and October.

All we need is for me to telephone you at a convenient time on some days and ask you five questions each time. All together, we will call you about 20 times. It will only take you a few minutes each time, but it will be of considerable help to us. In order to make up for any inconvenience we will give you $40.00 as a token of appreciation.

If you can help us out, we would like to make it as easy as possible for you and find out what the most convenient time is for contacting you in the evening.

Q15 On weekday evenings is there a time when it is particularly convenient to contact you or is anytime between 5:30 and 9:30 all right?
(PROBE IF NECESSARY: Is that the same every evening or are some evenings different?)

1. YES [FILL IN GRID] 2. NO - ALL TIMES SAME

a. Are there any times on some weekday evening when you have a favorite TV show or you are away or there is some other reason why we should not try to contact you? [IF AWAY ALL EVENING, TRY TO OBTAIN TIME JUST BEFORE LEAVES--EVEN IF BEFORE 5:30]

1. YES [FILL IN GRID] 2. NO - ANYTIME OK

b. (Except for those times) ... is it all right to call as late as 9:30 or is that too late? [CIRCLE 9:30 OR WRITE LATEST TIME]

	ALL DAYS SAME FROM-TO	MONDAY FROM-TO	TUESDAY FROM-TO	WEDNESDAY FROM-TO	THURSDAY FROM-TO	FRIDAY FROM-TO
BEST	__ - __	__ - __	__ - __	__ - __	__ - __	__ - __
WORST	__ - __ REASON: _____ _____	__ - __ REASON: _____ _____	__ - __ REASON: _____ _____	__ - __ REASON: _____ _____	__ - __ REASON: _____ _____	__ - __ REASON: _____ _____
LATEST	9:30 __	9:30 __	9:30 __	9:30 __	9:30 __	9:30 __

Q16 Is there any particular weekday when you are usually out away from home at a particular time during the morning or afternoon?

1. YES	2. NO

a. When is that?
(PROBE: Any other time?)

DAY: _____ FROM ___ :___ TO ___ :___

DAY: _____ FROM ___ :___ TO ___ :___

DAY: _____ FROM ___ :___ TO ___ :___

Q17 Is there any particular time during the morning or afternoon on most weekdays when you are usually out?

1. YES	2. NO

a. When is that?
(PROBE: Any other time?)

FROM ___ :___ TO ___ :___

FROM ___ :___ TO ___ :___

FROM ___ :___ TO ___ :___

FROM ___ :___ TO ___ :___

Q18 What is your telephone number?

1. TELEPHONE NUMBER. ___ ____

Q19 Who should we ask for when we telephone you?

NAME _____

Those are all the questions for now. I can give you the check for $40.00 right now, if you can give me your full name to write it in here. (TAKE OUT CHECK)

1. FILL OUT CHECK [COPY LAST NAME TO Q19]
2. GET SIGNATURE ON RECEIPT
3. REMIND RESPONDENT TO PUT 0-10 SCALE(S) ON TELEPHONE(S)

Q20 TIME END ____:____

Show Cards

(All three cards were used in the first interview. The last "card" was a peel-off label which was left with the respondent with instructions that it be put on or near the telephone for use during the telephone interviews).

CARD A

Not Annoying At All 0 1 2 3 4 5 6 7 8 9 10 Extremely Annoying

CARD B

NOT AT ALL

SLIGHTLY

MODERATELY

VERY

EXTREMELY

(PEEL-OFF SCALE)

Not Annoying at all 0 1 2 3 4 5 6 7 8 9 10 Extremely Annoying

OR

Not heard this day

Repeated Short Telephone Questionnaire (Core Questionnaire)

****** REPEATED TELEPHONE QUESTIONNAIRE ****** dot-short-q R8
Approved for use through 04/30/85
O.M.B. No. 2120-503

FIRST CARD III 6 7 [0][3]

INTERVIEW [1][2][3] PERSON [4][5] SERIAL (0)(2)

CONTACT DATE: 9 Sept. 10 Oct. [ ][ ] MO / [ ][ ] DAY (8-11)

INTERVIEWER [ ][ ] (12-13)

IS THIS INTERVIEW (14)
1. Same day
2. Yesterday
3. Non-int

(1) DO NOT RECORD EVENTS OF LESS THAN 10 MINUTES AS A SEPARATE EPISODE
(2) COUNT TIME SPENT AT NEARBY NEIGHBORS (within 3 houses) AS "TIME AROUND HOME"

TIME START [ ][ ][ ][ ] (15-18)
1. AM
2. PM (19)

01 We again need to find out whether you were around home today from 8:00 in the morning until 5:00 in the afternoon. Starting at 8:00 were you at home or away from home?

REPEAT FROM HERE FOR EACH EPISODE. RECORD FIRST EPISODE UNDER "EPISODE 1"

a. So at ...(8:00) ...you were ...

1. Away from home

b. What time did you get back home?

RECORD IN "TIME END" BOX AND START NEW EPISODE

A. Around home

c. Were you indoors or outdoors at ... (8:00) ...?
2. OUTDOORS 3. INDOORS

d. What time did you then go back indoors or leave the area?

RECORD IN "TIME END" BOX AND START NEW EPISODE

e. Did you go outdoors or leave home (again) later in the day?
B. NO C. YES

RECORD "5:00" IN "TIME END" BOX AND GO TO NEXT QUESTION

f. What time was that?

RECORD TIME IN "TIME END" BOX AND START NEW EPISODE

FIRST CARD III

	TIME BEGIN	1. AWAY	AROUND HOME 2. OUTDOORS	AROUND HOME 3. INDOORS	TIME END	
EPISODE 1	8:00					(20) (21-24)
EPISODE 2	:					(25) (26-29)
EPISODE 3	:					(30) (31-34)
EPISODE 4	:					(35) (36-39)
EPISODE 5	:					(40) (41-44)
EPISODE 6	:					(45) (46-49)
EPISODE 7	:					(50) (51-54)
EPISODE 8	:					(55) (56-59)
EPISODE 9	:					(60) (61-64)
EPISODE 10	:					(65) (66-69)

[IF AWAY ALL DAY FILL EPISODE 1 AND END INTERVIEW]

[IF MORE THAN 10 USE SUPPLEMENTAL PAGE AND CHECK HERE ☐]

FIRST CARD 111

70-78 SKP

79 80

[1][1]

SECOND CARD IV

1-5 DUP

6 7

[0][9]

Q2 Did you sleep or try to take a nap during the day? (8)

[1. YES] [2. NO]

a. What time was that?

BEGIN: [ ][ ][ ][ ] (9-12)

END : [ ][ ][ ][ ] (13-16)

Q3 Did you have any of the windows open in your house today?

[YES - OPEN] [2. NO - ALL WERE CLOSED] (17)

a. In the rooms you were in were the windows open or closed most of the time?

3. MOSTLY OPEN
4. MOSTLY CLOSED

*CHECK IF SCALE NEAR TELEPHONE FIRST TIME

SECOND CARD IV

We are going to rate (today's) neighborhood sounds on your scale* which goes from 0, if you were "not at all annoyed" to 10 if you were "extremely annoyed." Remember to take into account both how many times you heard a sound as well as how much it bothered you when you did hear it. If you do not remember hearing a sound (today) don't rate it and I will mark it as "not heard."

Q4 When you were at home during the day (today) how much were you bothered or annoyed by the noise from . . . . . (cars) . . . ?

	RATING	NOT HEARD	
a. Cars	[ ][ ]	20	(18-19)
b. Trucks	[ ][ ]	20	(20-21)
c. Motorcycles	[ ][ ]	20	(22-23)
d. Jet airplanes	[ ][ ]	20	(24-25)
e. Helicopters	[ ][ ]	20	(26-27)
f. Small propeller airplanes	[ ][ ]	20	(28-29)
g. Neighbors' tools or yard equipment	[ ][ ]	20	(30-31)
h. Is there any other noise which bothered or annoyed you around here today? (DESCRIBE All. CIRCLE WORST)		20 (NONE)	(32-33)
1. IF YES How much did it bother you?	[ ][ ]		34 35 36 37 [ ][ ][ ][ ] SKP 38-39 (40-43)

TIME END [ ][ ][ ][ ]

**********FILL OUT AFTER INTERVIEW**********

ACCURACY OF EPISODE TIME REPORTING [ACCURACY OF POOREST REPORT]
1. Within 5 minutes 3. Within 30 minutes (44)
2. Within 15 minutes 4. Poorer than 30 minutes

IF MORE THAN TEN EPISODES RECORD NUMBER [ ][ ] (45-46)

IF NO INTERVIEW: DISPOSITION CODE [FROM FOLLOW UP RECORD] [ ] (47)

WAS R HOME 8 AM to 5 PM? 1. YES 2. NO 3. DK (48)

49-78 SKP
79-80 DUP

Next-to-Last Day Short Telephone Questionnaire

(This is the same as the repeated short questionnaire except that a section is added concerning the entire preceeding 24 hours).

****** NEXT TO LAST TELEPHONE QUESTIONNAIRE ******

dot-nlast-q R9
Approved for use through 04/30/85
O.M.B. No. 2120-503

FIRST CARD III & 7 [0 3]

INTERVIEW [1 2 2] PERSON [4 5] SERIAL

CONTACT DATE: 9 Sept. 10 Oct. [8 9] MO. / [10 11] DAY (8-11)

INTERVIEWER [12 13] (12-13)

IS THIS INTERVIEW (14)
1. Same day
2. Yesterday
3. Non-int

TIME START [15 16 17 18] (15-18)
1. AM
2. PM (19)

(1) DO NOT RECORD EVENTS OF LESS THAN 10 MINUTES AS A SEPARATE EPISODE
(2) COUNT TIME SPENT AT NEARBY NEIGHBORS (within 3 houses) AS "TIME AROUND HOME"

Q1 We again need to find out whether you were around home today from 8:00 in the morning until 5:00 in the afternoon. Starting at 8:00 were you at home or away from home?

REPEAT FROM HERE FOR EACH EPISODE. RECORD FIRS. EPISODE UNDER "EPISODE 1"

a. So at ...(8:00) ...you were ...

1. Away from home

b. What time did you get back home?

RECORD IN "TIME END" BOX AND START NEW EPISODE

A. Around home

c. Were you indoors or outdoors at ... (8:00) ...?
2. OUTDOORS
3. INDOORS

d. What time did you then go back indoors or leave the area?

RECORD IN "TIME END" BOX AND START NEW EPISODE

e. Did you go outdoors or leave home (again) later in the day?
B. NO
C. YES

RECORD "5:00" IN "TIME END" BOX AND GO TO NEXT QUESTION

f. What time was that?

RECORD TIME IN "TIME END" BOX AND START NEW EPISODE

FIRST CARD III

EPISODE 1	TIME BEGIN 8:00	1. AWAY	AROUND HOME: 2. OUTDOORS / 3. INDOORS	TIME END (20) (21-24)

[IF AWAY ALL DAY FILL EPISODE 1 AND END INTERVIEW]

EPISODE 2	TIME BEGIN :	1. AWAY	AROUND HOME: 2. OUTDOORS / 3. INDOORS	TIME END (25) (26-29)
EPISODE 3	TIME BEGIN :	1. AWAY	AROUND HOME: 2. OUTDOORS / 3. INDOORS	TIME END (30) (31-34)
EPISODE 4	TIME BEGIN :	1. AWAY	AROUND HOME: 2. OUTDOORS / 3. INDOORS	TIME END (35) (36-39)
EPISODE 5	TIME BEGIN :	1. AWAY	AROUND HOME: 2. OUTDOORS / 3. INDOORS	TIME END (40) (41-44)
EPISODE 6	TIME BEGIN :	1. AWAY	AROUND HOME: 2. OUTDOORS / 3. INDOORS	TIME END (45) (46-49)
EPISODE 7	TIME BEGIN :	1. AWAY	AROUND HOME: 2. OUTDOORS / 3. INDOORS	TIME END (50) (51-54)
EPISODE 8	TIME BEGIN :	1. AWAY	AROUND HOME: 2. OUTDOORS / 3. INDOORS	TIME END (55) (56-59)
EPISODE 9	TIME BEGIN :	1. AWAY	AROUND HOME: 2. OUTDOORS / 3. INDOORS	TIME END (60) (61-64)
EPISODE 10	TIME BEGIN :	1. AWAY	AROUND HOME: 2. OUTDOORS / 3. INDOORS	TIME END (65) (66-69)

[IF MORE THAN 10 USE SUPPLEMENTAL PAGE AND CHECK HERE ☐]

Q2 Did you sleep or try to take a nap during the day?

1. YES	2. NO

a. What time was that?

BEGIN: [ ][ ][ ][ ]

END : [ ][ ][ ][ ]

Q3 Did you have any of the windows open in your house today?

YES - OPEN	2. NO - ALL WERE CLOSED

a. In the rooms you were in were the windows open or closed most of the time?

3. MOSTLY OPEN
4. MOSTLY CLOSED

FIRST CARD III

70-78 SKP

79 80

[1][1]

SECOND CARD IV

1-5 DUP

6 7

[0][4]

(8)

(9-12)

(13-16)

(17)

We are going to rate (today's) neighborhood sounds on your scale which goes from 0, if you were "not at all annoyed" to 10 if you were "extremely annoyed." Remember to take into account both how many times you heard a sound as well as how much it bothered you when you did hear it. If you do not remember hearing a sound (today) don't rate it and I will mark it as "not heard."

Q4 When you were at home during the day (today) how much were you bothered or annoyed by the noise from . . . . . (cars) . . . ?

	RATING	NOT HEARD	
a. Cars	[ ][ ]	20	(18-19)
b. Trucks	[ ][ ]	20	(20-21)
c. Motorcycles	[ ][ ]	20	(22-23)
d. Jet airplanes	[ ][ ]	20	(24-25)
e. Helicopters	[ ][ ]	20	(26-27)
f. Small propeller airplanes	[ ][ ]	20	(28-29)
g. Neighbors' tools or yard equipment	[ ][ ]	20	(30-31)
h. Is there any other noise which bothered or annoyed you around here today? (DESCRIBE ALL. CIRCLE WORST)		20 (NONE)	(32 33)
i. IF YES How much did 't bother you?	[ ][ ]		34 35 36 37

[ ][ ][ ][ ]

SKP 38-39

(40-43)

TIME TO THIS POINT IN INTERVIEW [ ][ ][ ][ ]

********** *FILL OUT AFTER INTERVIEW**********

ACCURACY OF EPISODE TIME REPORTING (for daytime) [ACCURACY OF POOREST REPORT]
1. Within 5 minutes 3. Within 30 minutes
2. Within 15 minutes 4. Poorer than 30 minutes

(44)

IF MORE THAN TEN EPISODES (for daytime) RECORD NUMBER [ ][ ] (45-46)

IF NO INTERVIEW: DISPOSITION CODE [FROM FOLLOW UP RECORD] [ ] (47)

WAS R HOME 8 AM to 5 PM? 1. YES 2. NO 3. DK (48)

49-79 SKP

79-80 DUP

SECOND CARD IV

(1) DO NOT RECORD EVENTS OF LESS THAN 10 MINUTES AS A SEPARATE EPISODE
(2) COUNT TIME SPENT AT NEARBY NEIGHBORS (within 3 houses) AS "TIME AROUND HOME"

Q5 Now we have something a little different. In this interview we need to also ask about yesterday evening and night. First we need to find out whether you were around home from 5:00 in the afternoon yesterday until 8:00 in the morning today. Starting at 5:00 yesterday afternoon were you at home or away from home?

REPEAT FROM HERE FOR EACH EPISODE. RECORD FIRST EPISODE UNDER "EPISODE 1"

a. So at ...(5:00) ...you were ...

1. Away from home

b. What time did you get back home?

RECORD IN "TIME END" BOX AND START NEW EPISODE

A. Around home

c. Were you indoors or outdoors at ... (5:00) ...?
2. OUTDOORS
3. INDOORS

d. What time did you then go back indoors or leave the area?

RECORD IN "TIME END" BOX AND START NEW EPISODE

e. Did you go outdoors or leave home (again) later in the day?

B. NO: RECORD "8:00" IN "TIME END" BOX AND GO TO NEXT QUESTION

C. YES: f. What time was that?

RECORD TIME IN "TIME END" BOX AND START NEW EPISODE

THIRD CARD III

1-5 DUP

6 7 [5][3]

8-19 SKP

	TIME BEGIN	1. AWAY	AROUND HOME 2. OUTDOORS	AROUND HOME 3. INDOORS	TIME END	
EPISODE 1	5:00					(20) (21-24)
EPISODE 2	:					(25) (26-29)
EPISODE 3	:					(30) (31-34)
EPISODE 4	:					(35) (36-39)
EPISODE 5	:					(40) (41-44)
EPISODE 6	:					(45) (46-49)
EPISODE 7	:					(50) (51-54)
EPISODE 8	:					(55) (56-59)
EPISODE 9	:					(60) (61-64)
EPISODE 10	:					(65) (66-69)

[IF AWAY ALL EVENING AND NIGHT FILL EPISODE 1 AND END INTERVIEW]

[IF MORE THAN 10 USE SUPPLEMENTAL PAGE AND CHECK HERE ☐]

THIRD CARD III

Q6 What time did you go to bed last night and get up this morning?

GO TO BED: [ ][ ][ ][ ]

GET UP: [ ][ ][ ][ ]

Q7 Did you have any of the windows open in your house during the evening or night?

YES - OPEN	2. NO - ALL WERE CLOSED
a. In the rooms you were in were the windows open or closed most of the time? 3. MOSTLY OPEN 4. MOSTLY CLOSED	

THIRD CARD III

70-78 SKP

79 80 [1][1]

FOURTH CARD IV

1-5 DUP

6 7 [ ][ ]

8 SKP

(9-12)

(13-16)

(17)

FOURTH CARD IV

We are going to rate all the neighborhood sounds on your scale for the entire 24 hours which goes from 5:00 yesterday afternoon to 5:00 today. This includes yesterday evening and night as well as the time we already asked you about today. Remember to take into account both how many times you heard a sound as well as how much it bothered you when you did hear it. If you do not remember hearing a sound either last night or today don't rate it and I will mark it as "not heard."

Q8 When you were at home during the last 24 hours from 5:00 yesterday afternoon to 5:00 this afternoon how much were you bothered or annoyed by the noise from . . . . . (cars) . . . ?

	RATING	NOT HEARD	
a. Cars	[ ][ ]	20	(18-19)
b. Trucks	[ ][ ]	20	(20-21)
c. Motorcycles	[ ][ ]	20	(22-23)
d. Jet airplanes	[ ][ ]	20	(24-25)
e. Helicopters	[ ][ ]	20	(26-27)
f. Small propeller airplanes	[ ][ ]	20	(28-29)
g. Neighbors' tools or yard equipment	[ ][ ]	20	(30-31)
h. Is there any other noise which bothered or annoyed you around here yesterday evening or last night? (DESCRIBE All. CIRCLE WORST OF DAY (Q4) AND NIGHT)		20 (NONE)	(32-33)
1. IF YES How much did it bother you?	[ ][ ]		34 35 36 37 [ ][ ][ ][ ]

TIME END [ ][ ][ ][ ]

SKP 38-39

(40-43)

**********FILL OUT AFTER INTERVIEW**********

ACCURACY OF EPISODE TIME REPORTING (for 5:00 to 8:00)[ACCURACY OF POOREST REPORT]
1. Within 5 minutes 3. Within 30 minutes
2. Within 15 minutes 4. Poorer than 30 minutes

(44)

IF MORE THAN TEN EPISODES (for 5:00 to 8:00) RECORD NUMBER [ ][ ]

(45-46)

47-78 SKP
79-80 (NIP

Concluding Telephone Questionnaire

******CONCLUDING TELEPHONE QUESTIONNAIRE ****** dot-end-q R9

Approved for use through 04/30/85
O.M.B. No. 2120-503

FIRST CARD 111 67

INTERVIEW [ ][ ][ ] [2][6] (8-11)
PERSON SERIAL

CONTACT DATE: 9 SEPT. 10 OCT. [ ][ ] / [ ][ ] (12-13)
MO. DAY

INTERVIEWER [ ][ ] (14)

IS THIS INTERVIEW 1. SAME DAY 2. YESTERDAY 3. NON-INT (15-18)

TIME START [ ][ ][ ][ ] (19)
1. AM 2. PM

(1) DO NOT RECORD EVENTS OF LESS THAN 10 MINUTES AS A SEPARATE EPISODE
(2) COUNT TIME SPENT AT NEARBY NEIGHBORS (WITHIN 3 HOUSES) AS "TIME AROUND HOME"

Q1 We again need to find out whether you were around home today from 8:00 in the morning until 5:00 in the afternoon. Starting at 8:00 were you at home or away from home?

REPEAT FROM HERE FOR EACH EPISODE. RECORD FIRST EPISODE UNDER "EPISODE 1"

a. So at ...(8:00) ...you were ...

1. Away from home

b. What time did you get back home?

RECORD IN "TIME END" BOX AND START NEW EPISODE

A. Around home

c. Were you indoors or outdoors at ... (8:00) ...?
2. OUTDOORS 3. INDOORS

d. What time did you then go back indoors or leave the area?

RECORD IN "TIME END" BOX AND START NEW EPISODE

e. Did you go outdoors or leave home (again) later in the day?
B. NO C. YES

RECORD "5:00" IN "TIME END" BOX AND GO TO NEXT QUESTION

f. What time was that?

RECORD TIME IN "TIME END" BOX AND START NEW EPISODE

FIRST CARD 111

	TIME BEGIN	1. AWAY	AROUND HOME 2. OUTDOORS	AROUND HOME 3. INDOORS	TIME END	
EPISODE 1	8:00					(20) (21-24)
EPISODE 2	:					(25) (26-29)
EPISODE 3	:					(30) (31-34)
EPISODE 4	:					(35) (36-39)
EPISODE 5	:					(40) (41-44)
EPISODE 6	:					(45) (46-49)
EPISODE 7	:					(50) (51-54)
EPISODE 8	:					(55) (56-59)
EPISODE 9	:					(60) (61-64)
EPISODE 10	:					(65) (66-69)

[IF AWAY ALL DAY FILL EPISODE 1 AND GO TO Q5]

[IF MORE THAN 10 USE SUPPLEMENTAL AND CHECK HERE ☐]

Q2 Did you sleep or try to take a nap during the day?

1. YES	2. NO
a. What time was that? BEGIN: ____ END: ____	

Q3 Did you have any of the windows open in your house today?

YES - OPEN	2. NO - ALL WERE CLOSED
a. In the rooms you were in were the windows open or closed most of the time? 3. MOSTLY OPEN 4. MOSTLY CLOSED	

FIRST CARD III

70-78 SKP

79 80 [1][1]

SECOND CARD IV

1-5 DUP

6 7 [0][4]

(8)

(9-12)

(13-16)

(17)

We are going to rate (today's) neighborhood sounds on your scale which goes from zero, if you were "not at all annoyed" to 10 if you were "extremely annoyed." Remember to take into account both how many times you heard a sound as well as how much it bothered you when you did hear it. If you do not remember hearing a sound (today) don't rate it and I will mark it as "not heard."

Q4 When you were at home during the day (today) how much were you bothered or annoyed by the noise from . . . . . (cars) . . . ?

	RATING	NOT HEARD	
a. Cars	[ ][ ]	20	(18-19)
b. Trucks	[ ][ ]	20	(20-21)
c. Motorcycles	[ ][ ]	20	(22-23)
d. Jet airplanes	[ ][ ]	20	(24-25)
e. Helicopters	[ ][ ]	20	(26-27)
f. Small propeller airplanes	[ ][ ]	20	(28-29)
g. Neighbors' tools or yard equipment	[ ][ ]	20	(30-31)
h. Is there any other noise which bothered or annoyed you around here today? (DESCRIBE All. CIRCLE WORST)		20 (NONE)	(32-33)
1. IF YES How much did it bother you?	[ ][ ]		34 35 36 37 [ ][ ][ ][ ]

38-78 SKP
79-80 DUP

SECOND CARD IV

THIRD CARD
VII
1-5 DUP

This is the last time we will be calling so I have a few extra questions now.

6 7
[0|7]

Q5 These questions are about this past year, not just today. Taking everything into consideration, how would you rate this neighborhood as a place to live? Would you say it is excellent, good, fair, or poor?

8-16 SKP

1. EXCELLENT
2. GOOD
3. FAIR
4. POOR

(17)

Now think about the noises during this whole past year. We need to use the same zero to ten scale to rate how bothered or annoyed you were by each sound this last year and not just today. Take into account both how often you hear the sound and how much it bothers you when you do hear it. If you have never heard some sound around here tell me, but if you ever hear it, rate it somewhere from zero to ten.

Q6 Thinking about this last year, how do you feel about the sounds from ...(cars)... around here? How much have they bothered or annoyed you?

	RATING	DO NOT HEAR	
a. Cars	☐☐	20	(18-19)
b. Trucks	☐☐	20	(20-21)
c. Motorcycles	☐☐	20	(22-23)
d. Jet airplanes	☐☐	20	(24-25)
e. Helicopters	☐☐	20	(26-27)
f. Small propeller airplanes	☐☐	20	(28-29)
g. Neighbors' tools or yard equipment	☐☐	20	(30-31)

h. Are there any other noises which bother or annoy you around here? (DESCRIBE ALL. IF MORE THAN ONE CIRCLE MOST ANNOYING AND RATE IN "i") _____ 20 (NONE)

_____

_____

i. IF YES How much does it bother or annoy you? ☐☐ (32-33)

34 35 36 37
☐☐☐☐

38-39 SKP

THIRD CARD VII

Q7 Now another question about how annoying the noise from cars was around here this last year. Would you say the noise from cars was not at all annoying, slightly annoying, moderately annoying, very annoying, or extremely annoying?

1. NOT AT ALL
2. SLIGHTLY
3. MODERATELY
4. VERY
5. EXTREMELY

(40)

41-47 SKP

Q8 Let's look at that zero to ten annoyance scale again: What is the lowest number you would use and still say you were "highly annoyed"?

SCALE NUMBER ☐☐

(48-49)

50-78 SKP
79-80 DUP

FOURTH CARD
VIII
1-5 DUP

The next questions ask about the time since the middle of September when we have been calling you.

Q8 In terms of the amount of time you spend at home, how typical have these weeks been when we called you? Would you say you have spent more time than usual at home, less time than usual, or about the usual amount of time at home?

6 7
[0|8]

1. MORE AT HOME
2. LESS AT HOME
3. USUAL

(8)

Now think about the noises during this 8-week period when we have been calling you. We need to use the same zero to ten scale to rate how bothered or annoyed you were by each sound during this period.

9-17 SKP

Q9 Thinking about this 8-week period while we have been calling you, how did you feel about the sounds from ...(cars)... around here? How much did they bother or annoy you?

	RATING	DO NOT HEAR	
a. Cars	☐☐	20	(18-19)
b. Trucks	☐☐	20	(20-21)
c. Motorcycles	☐☐	20	(22-23)
d. Jet airplanes	☐☐	20	(24-25)
e. Helicopters	☐☐	20	(26-27)
f. Small propeller airplanes	☐☐	20	(28-29)
g. Neighbors' tools or yard equipment	☐☐	20	

h. Are there any other noises which bothered or annoyed you around here during this period? (DESCRIBE ALL. IF MORE THAN ONE CIRCLE MOST ANNOYING AND RATE IN "i") _____ 20 (NONE) (30-31)

_____

_____

i. IF YES How much did it bother or annoy you? ☐☐ (32-33)

34 35 36 37
☐☐☐☐

38-50 SKP

FOURTH CARD VIII

Q10 How typical has the noise been during the weeks we have been calling you; would you say the ...(cars)... were more noisy than usual, about like usual or less noisy than usual?

	MORE NOISY	ABOUT LIKE USUAL	LESS NOISY	NEVER HEAR NOISE (VOLUNTEER)	
a. Cars	1	2	3	0	(51)
b. Trucks	1	2	3	0	(52)
c. Motorcycles	1	2	3	0	(53)
d. Jet airplanes	1	2	3	0	(54)
e. Helicopters	1	2	3	0	(55)
f. Small propeller planes	1	2	3	0	(56)
g. Neighbors' tools or yard equipment	1	2	3	0	(57)

Q11 Has our calling and asking about noise made you notice the noise around here more or not?

1. NOTICE MORE
2. NOT NOTICE MORE (58)
3. OTHER (RECORD VERBATIM) _____

Q12 Has our asking about noise changed how you feel about the noises which have always been here; that is, when you hear those same noises now are you more bothered now, less bothered now, or about as bothered as you used to be?

1. MORE NOW
2. LESS NOW
3. ABOUT AS USED TO BE (59)
4. OTHER (RECORD VERBATIM) _____

FOURTH CARD VIII

	JET AIRPLANES	HELICOPTERS	SMALL PROPELLER AIRPLANES	
(COMPLETE Q13a AND b FOR EACH AIRCRAFT TYPE BEFORE ASK ABOUT NEXT TYPE)				
(GO TO Q13a IF HEARD ON Q6) Q13 Have you ever heard any [...jet airplanes..... / ... helicopters ..... / small propeller aircraft] here?	EVER HEARD TYPE?			
	YES / 1.NO (SKP)	YES / 1.NO (SKP)	YES / 1.NO (SKP)	
IF YES OR HEARD ON Q6 a. When you hear a [...jet airplane..... / ... helicopter ..... / small propeller aircraft] fly overhead, are you ever afraid it might crash nearby?	a. EVER AFRAID IT MIGHT CRASH			
	YES / 2.NO	YES / 2.NO	YES / 2.NO	(60-62)
	IF YES			
YES b. When you hear it do you only occasionally fear it might crash, sometimes fear it might crash, or usually fear it might crash?	3.ONLY OCCASIONALLY 4.SOMETIMES 5.USUALLY	3.ONLY OCCASIONALLY 4.SOMETIMES 5.USUALLY	3.ONLY OCCASIONALLY 4.SOMETIMES 5.USUALLY	
NO (GO TO NEXT TYPE)				
COMPLETE ALL AIRCRAFT TYPES ON Q13 BEFORE GOING TO Q14				
(ASK ABOUT HEARD TYPES) Q14 Do you know whether the [...jet airplanes..... / ... helicopters ..... / small propeller aircraft] around here are mainly civilian or mainly military?	ARE MAINLY			
	1. CIVILIAN 2. MILITARY 3. NOT KNOW	1. CIVILIAN 2. MILITARY 3. NOT KNOW	1. CIVILIAN 2. MILITARY 3. NOT KNOW	(63-65)
a. Are the [...jet airplanes..... / ... helicopters ..... / small propeller aircraft] just flying by or are they from Patrick Henry, Fort Eustis or somewhere else?	a. WHERE FROM			
	1.FLYING BY 2.PAT. HENRY 3.FT. EUSTIS 4.OTHER 5.NOT KNOW	1.FLYING BY 2.PAT. HENRY 3.FT. EUSTIS 4.OTHER 5.NOW KNOW	1.FLYING BY 2.PAT. HENRY 3.FT. EUSTIS 4.OTHER 5.NOT KNOW	(66-68)
b. How important do you feel that those [...jet airplane..... / ... helicopter ..... / small propeller aircraft] flights are? Are they very important, somewhat important, a little important, or not at all important?	b. HOW IMPORTANT			
	1.VERY 2.SOMEWHAT 3.A LITTLE 4.NOT AT ALL	1.VERY 2.SOMEWHAT 3.A LITTLE 4.NOT AT ALL	1.VERY 2.SOMEWHAT 3.A LITTLE 4.NOT AT ALL	(69-71)
c. Do you feel the pilots or other authorities could do anything to reduce the noise from those [...jet airplanes..... / ... helicopters ..... / small propeller aircraft]?	c. COULD DO ANYTHING TO REDUCE NOISE			
	YES / 1.NO	YES / 1.NO	YES / 1.NO	
	IF YES			(72-74)
YES d. Do you think that they could reduce the noise a lot, somewhat, or only a little?	2.A LOT 3.SOMEWHAT 4.ONLY A LITTLE	2.A LOT 3.SOMEWHAT 4.ONLY A LITTLE	2.A LOT 3.SOMEWHAT 4.ONLY A LITTLE	
NO (GO TO NEXT TYPE)				

FOURTH CARD VIII

Now we have a few background questions for you.

Q15 What year were you born? (75-76)

19 ☐☐

Q16 What is the highest grade of school you have completed?

1. GRADE SCHOOL (1-8)
2. SOME HIGH SCHOOL (9-11)
3. HIGH SCHOOL GRADUATE (12) (77)
4. SOME COLLEGE
5. COLLEGE GRADUATE
6. MORE THAN 4 YEARS OF COLLEGE

Q17 During the time you have lived in this house has the noise around here increased, decreased, or stayed about the same?

1. INCREASED
2. DECREASED (78)
3. STAYED SAME
4. OTHER PATTERN (DESCRIBE) _____

_____

79-80 DUP

FIFTH CARD IX 1-5 DUP

6 7

Q18 Do you know of anyone else around here who has been taking part in this study?

YES	2. NO	0 9

a. Do you know whether they have been called often like you or were only called once?
3. OFTEN
4. ONCE
5. DON'T KNOW

(8)

Q19 Have any of your neighbors ever talked about this study with you?

YES-TALKED	2. NO-NOT TALKED

a. How many times have you talked with neighbors about the study; once or twice, 3 to 5 times, 6 to 10 times, or more than 10 times?

3. ONCE OR TWICE
4. THREE TO FIVE
5. SIX TO TEN
6. MORE THAN 10
7. OTHER (DESCRIBE) _____

(9)

Q20 Some people say this study is not really about noise generally, but only about some one type of noise. Have any of your neighbors or family said they thought that the study was really only about one type of noise?

YES-ONE TYPE	10. NO-NOT SAID (DON'T KNOW)

a. What type of noise did they think it was about?

01.CARS	04.JETS	07.NEIGHBORS' TOOLS OR YARD EQUIPMENT
02.TRUCKS	05.HELICOPTERS	
03.MOTORCYCLES	06.SMALL PLANES	08.OTHER (DESCRIBE)

(10-11)

Q21 Do you personally think that the study sponsors are mainly interested in only one type of noise or in all types of noise?

ONE TYPE	10. ALL TYPES 11. DON'T KNOW (ACCEPT IF VOLUNTEERED)

a. Which one type do you think they are interested in?

01.CARS	04.JETS	07.NEIGHBORS' TOOLS OR YARD EQUIPMENT
02.TRUCKS	05.HELICOPTERS	
03.MOTORCYCLES	06.SMALL PLANES	08.OTHER (DESCRIBE)

(12-13)

FOURTH CARD IX

Q22 We want to know how you feel about receiving $40 for taking part in the study. Considering the length of the interviews and the number of times we called you, would you say that $40 is more than is needed, about right or too little?

1. MORE THAN NEEDED
2. ABOUT RIGHT
3. TOO LITTLE

(14)

Q23 How did you first hear that people were being paid $40 in this study: from the interviewer, from a neighbor or from someone else?

INTERVIEWER

a. Do you happen to remember whether the interviewer mentioned the $40 at the start of the interview or at the end of the interview?

05. AT START
06. AT END
07. OTHER (DESCRIBE) _____
_____
08. DO NOT REMEMBER

02. NEIGHBOR
03. OTHER (DESCRIBE) _____
_____
04. DO NOT REMEMBER

(15-16)

Q24 Those are all the questions I have for you and this is the last time I call you. Do you have any questions you would like to ask me?

2. YES [WRITE QUESTION VERBATIM] _____
_____
_____

1. NO

(17)
18-19 ☐☐
20-21 ☐☐
22-39 SKP

********** FILL OUT AT END **********

Q25 TIME END ☐☐:☐☐ (40-43)

Q26 ACCURACY OF EPISODE TIME REPORTING [ACCURACY OF POOREST REPORT]

1. Within 5 minutes
2. Within 15 minutes
3. Within 30 minutes
4. Poorer than 30 minutes

(44)

Q27 IF MORE THAN 10 EPISODES RECORD NUMBER ☐☐ (45-46)

IF NO INTERVIEW: DISPOSITION CODE [FROM FOLLOW UP RECORD] ☐ (47)

WAS R HOME 8 AM TO 5 PM? 1. YES 2. NO 3. DK (48)

49-78 SKP
79-80 DUP

APPENDIX C:

DISPOSITION OF SAMPLE ADDRESSES

The results of visits to 861 sample addresses within the study area are as follows:

Disposition of address	Number
House vacant	19
No eligible resident	407
No contact with anyone at address	
Appear to be eligible residents	2
Appear to not be eligible residents	19
Refused information	
Appear to be eligible residents	10
Appear to not be eligible residents	12
No information about eligibility	24
Refused interview	26
Refused follow-up after completing initial interview	4
Initial interview with agreement to follow-up	338
Total addresses	861

The response rate has been calculated on the percentage of eligible residents who agreed to participate in the full survey program, including the follow-up program. The 404 eligible members of the population include the 2 "no contact" addresses where someone appeared to be eligible, the 10 "refuse information" addresses where someone appeared to be eligible, the 24 "refuse information" addresses for which there is no information about eligibility, the 26 "refuse interview" addresses, the 4 "refuse follow-up" addresses and the 338 interviews. On this basis there is a response rate of 84%.

Of the 338 respondents who agreed to participate, 330 were contacted for a final interview. Of the 8 who could not be contacted, 4 had moved and could not be contacted at their new addresses, 2 were deemed to have too poor a command of English to be interviewed by telephone, 1 was never home, and 1 had apparently never intended to participate (refused the honorarium).

APPENDIX D:

INSTRUCTIONS FOR INTERVIEWERS

Initial Face-to-Face Interviewing Instructions

(These provide the basic instructions for administering the interviews in this study. Some materials used for general instruction in interviewing methods is not reproduced in this report. Many of the instructions in the following document also apply to the telephone interviews).

ENVIRONMENTAL SURVEY INTERVIEWER INSTRUCTIONS

August 1983

TABLE OF CONTENTS

A. Relationship to "Introduction to Interviewing"

This set of instructions supplements the information about basic interviewing principles which is available in the "Introduction to Interviewing" The only revision to that information concerns the method of dealing with errors. For this Environmental Survey all recording should be done in pencil. If a recording error is made or if marginal notes later are found to be illegible, they can be erased and corrected.

B. Overview of Survey

One of the major problems faced in community planning is that of determining the types of environments which are or are not acceptable to people in residential areas. In order to make this determination, social surveys of people living in many different types of residential environments have been carried out. In this particular case it is a federal agency, the Department of Transportation, which has found that it needs information about residents' reactions to different types of noise enironments. The Bionetics Corporation is gathering this information by conducting a social survey on the Peninsula.

The information will only be used for national planning purposes and will not be used in relation to any particular local problems. The study areas have been chosen because they are typical of particular types of residential areas. This means that though most noise surveys are concentrated in noisy areas, there must also be interviews in more typical quiet residential areas to provide a basis for comparison to noisy areas.

This particular survey is primarily concerned with residents' reactions to environmental noise. Residents will receive a letter from Bionetics informing them that an interviewer will come to their home (See "Respondent Letter" p.28). An initial face-to-face interview in the home is then followed by about 21 short evening telephone interviews spread over about two months. Since the evening telephone interviews concern the noise during the

daytime, part of the initial contact at each address will involve a "Respondent Selection Sheet" which will determine whether there is an eligible respondent at the address. Physical noise level measurements are being made in the area during the daytime by acousticians. As these measurements can not be made under unusual weather conditions, it may be necessary to change the dates for some of the follow-up telephone interviews.

C. Detailed Question by Question Instructions

Question-by-question instructions are written into the survey form on the following pages. In a few instances where longer comments are necessary they appear after the questionnaire in a set "Extended Question-by-Question notes" (page 15).

QUESTION BY QUESTION INSTRUCTIONS

ENVIRONMENT SURVEY dot-face-q '78
Approved for use through 04/30/85
O.M.B. No. 2120-0503

(OFFICE INTERVIEW ID)

FIRST CARD
I
1 2 3 4 5
[ ][ ][ ]- [0][1]
6 7
[0][1]

To avoid a mixup, fill in before interview is started.

SAMPLE ID [ ][ ][ ] - [ ][ ] (8-12)
INTERVIEWER ID [ ][ ]
YOUR INTERVIEW NO. [ ][ ]

This is the number of interviews you have done including this one.

We want to find out about the environment around here and how you feel about it over the next few weeks.

Q1 How do you feel about this area, the block or so right around here? What are the things you like most about this area, that is, the things you feel are advantages and make it a good place to live?

START TIME [ ][ ][ ][ ] - Record time. (17-20)

Stress "like most". Record verbatim. When probing include "block or so right around here" for distance. "Advantages" are anything the respondent feels are advantages.

21 22
[ ][ ]
23 24
[ ][ ]

Q2 Are there any things you particularly dislike about this area, that is things which are disadvantages?
(RECORD ANSWERS. RECORD ALL PHRASES DESCRIBING ENVIRONMENTAL NUISANCES VERBATIM)

25 26
[ ][ ]
27 28
[ ][ ]
29 30
[ ][ ]
31 32
[ ][ ]

Stress "dislike". Probe for completeness until no more disadvantages are given. Questions 1, 2, & 3 are important because the respondent does not yet know that noise is of special importance in the questionnaire. It is very important therefore not to mention "noise" at any time in the respondent selection process or during the first three questions. It is, however, important to determine whether the disadvantages in Q.2 are noise related. The responses "traffic", "cars", "airplanes", "motorcycles" are not satisfactory, because the disadvantage may relate to some other aspect. Probes should be used (i.e. What is it about the. . . which is a disadvantage?) to get the respondent to be specific.

33-78 SKP
79 80
[1][1]

SECOND CARD
II
1-5 DUP
6 7
[0][2]

Q3 Taking everything into consideration, how would you rate this neighborhood as a place to live? Would you say it is excellent, good, fair, or poor?

1 EXCELLENT
2 GOOD
3 FAIR
4 POOR

Answers must be in one of these categories. Repeat question or probe for one response if necessary (i.e., "Which would you choose if you had to give only one?")

8-16 SKP
(17)

SECOND CARD II

In a moment I will ask you to rate some of the sounds around here using this scale (SHOW CARD A). Any sound can be rated somewhere between 0, if you are "not at all annoyed," to 10 if you are "extremely annoyed", that is the more annoyed, the bigger the number. If you have never heard some sound around here tell me, but if you ever hear it, rate it somewhere from zero to ten on this scale. When you rate a sound take into account both how often you hear and how much it bothers you when you do hear it.

-- Read slowly and be sure respondent is following what you are saying --

Q4 Thinking about this last year, how do you feel about the sounds from ...(cars)... around here? How much do they bother or annoy you?

	RATING	DO NOT HEAR	
a. Cars	☐☐	20	(18-19)
b. Trucks	☐☐	20	(20-21)
c. Motorcycles	☐☐	20	(22-23)
d. Jet airplanes	☐☐	20	(24-25)
e. Helicopters	☐☐	20	(26-27)
f. Small propeller airplanes	☐☐	20	(28-29)
g. Neighbors' tools or yard equipment	☐☐	20	(30-31)
h. Are there any other noises which bother or annoy you around here? (DESCRIBE ALL. IF MORE THAN ONE CIRCLE MOST ANNOYING AND RATE IN "i") _____		20 (NONE)	(32-33)
i. IF YES How much does it bother or annoy you?	☐☐		34 35 36 37 ☐☐☐☐

Read complete introduction.

For trucks start at..."how do you feel..."

If respondent now understands question it is only necessary to say "how about..." for the remaining categories.

38-39 SKP

Q5 Please look at this card (SHOW CARD B) and tell me how annoying the noise from cars is around here. Would you say the noise from cars was not at all annoying, slightly annoying, moderately annoying, very annoying, or extremely annoying?

1 NOT AT ALL
2 SLIGHTLY
3 MODERATELY
4 VERY
5 EXTREMELY

_____

See Q.3 instructions.

(40)

SECOND CARD II

The next questions are about where you spend your time.

IF BEFORE 5 PM OR WEEKEND CIRCLE "4" AND ASK "a". See "Extended "Question" by Question Notes"

Q6 Were you at home most of the day today?

2. YES (ASK Q7-Q10 ABOUT TODAY)	3. NO 4. BEFORE 5 PM OR WEEKEND
Circle 2, 3, or 4.	a. What was the most recent weekday you were at home most of the day?
	1. DAY OF WEEK: 1.M 2.Tu 3.W 4.Th 5.F
	11. WEEK 1. THIS WEEK 2. LAST WEEK 3. BEFORE LAST WEEK
	IF BEFORE LAST WEEK: MONTH _____ DATE _____
	(ASK Q7-Q10 ABOUT THAT DAY)

(41)

(42)

(43)

44 45 ☐☐

46 47 ☐☐

48-78 SKP
79-80 DUP

Q7 We need to find out whether you were around home ... (yesterday) ... from 8:00 in the morning until 5:00 in the afternoon. Starting at 8:00 were you at home or away from home?

Be sure to use the proper word (i.e., "yesterday", "today", "last Wednesday", "Tuesday").

Don't count "bike riding" or "walking" as time spent away from home

(1) DO NOT RECORD EVENTS OF LESS THAN 10 MINUTES AS A SEPARATE EPISODE
(2) COUNT TIME SPENT AT NEARBY NEIGHBORS (within 3 houses) AS "TIME AROUND HOME"

This is a good time to train respondents to try to carefully define their episodes. Probe for accuracy. if necessary explain that accuracy is needed to link responses to noise measurement data.

THIRD CARD III

1-5 DUP

6 7 ☐☐ 0 3

REPEAT FROM HERE FOR EACH EPISODE. RECORD FIRST EPISODE UNDER "EPISODE 1"

a. So at ...(8:00) ...you were ... Record the episodes starting with "Episode 1" on the next page.

1 Away from home ... Around home (or at a neighbors)

b. What time did you get back home?

RECORD IN "TIME END" BOX AND START NEW EPISODE

c. Were you indoors or outdoors at ... (8:00) ... ?
2 OUTDOORS 3 INDOORS

d. What time did you then go back indoors or leave the area?

RECORD IN "TIME END" BOX AND START NEW EPISODE

e. Did you go outdoors or leave home (again) later in the day?
A. NO B. YES

f. What time was that?

RECORD "5:00" IN "TIME END" BOX AND GO TO NEXT QUESTION	RECORD TIME IN "TIME END" BOX AND START NEW EPISODE

Do not record in the above boxes. All information will be recorded on the following page.

One code must be circled for each episode; either 1-away, 2-outdoors or 3-indoors

THIRD CARD III

	TIME BEGIN	1. AWAY	AROUND HOME		TIME END	
			2. OUTDOORS	3. INDOORS		
EPISODE 1	8:00					(20) (21-24)
EPISODE 2	:					(25) (26-29)
EPISODE 3	:					(30) (31-34)
EPISODE 4	:					(35) (36-39)
EPISODE 5	:					(40) (41-44)
EPISODE 6	:					(45) (46-49)
EPISODE 7	:					(50) (51-54)
EPISODE 8	:					(55) (56-59)
EPISODE 9	:					(60) (61-64)
EPISODE 10	:					(65) (66-69)

time explanation - See "Extended Question by Question Notes"

[IF MORE THAN 10 USE SUPPLEMENTAL PAGE AND CHECK HERE ☐]

THIRD CARD III

70-78 SKP

79 80 DUP

FOURTH CARD IV

1-5 DUP

6 7

0 4

Q8 Did you sleep or try to take a nap during the day?

1. YES	2. NO
a. What time was that? BEGIN: ☐☐☐☐ END : ☐☐☐☐	If a respondent already mentioned sleeping until after 8 a.m. - consider that as a nap and record here (i.e., 8:00-9:00) but do ask Q.9 in case there were other naps. If a respondent took more than one nap in one day write it out in available space.

(8)

(9-12)

(13-16)

Q9 Did you have any of the windows open in your house ... (yesterday) ...?

YES - OPEN	2. NO - ALL WERE CLOSED
a. In the rooms you were in were the windows open or closed most of the time? 3. MOSTLY OPEN 4. MOSTLY CLOSED	If answer to Q.9 is "yes" ask "a"

(17)

FOURTH CARD IV

Now we are going to use a zero to ten scale to rate some sounds you may have heard while you were at home ... (yesterday) [GIVE PEEL-OFF SCALE CARD]. Take into account both how many times you heard the sound ... (yesterday) ... and how much it bothered you when you did hear it. We only need to know about the sounds you heard in the morning and afternoon because the noise level measurements have only been made during the day.

Q10 When you were at home during the day ... (yesterday) ... how much were you bothered or annoyed by the noise from ... (cars) ...?

	RATING	NOT HEARD	
a. Cars	☐☐	20	(18-19)
b. Trucks	☐☐	20	(20-21)
c. Motorcycles	☐☐	20	(22-23)
d. Jet airplanes	☐☐	20	(24-25)
e. Helicopters	☐☐	20	(26-27)
f. Small propeller airplanes	☐☐	20	(28-29)
g. Neighbors' tools or yard equipment	☐☐	20	(30-31)
h. Is there any other noise which bothered or annoyed you around here ... yesterday ...? (DESCRIBE ALL. CIRCLE WORST)		20 (NONE)	(32-33)
i. IF YES How much did it bother you?	☐☐		34 35 36 37 ☐☐☐☐

Q.10 Introduction: Be sure respondent knows you are referring to yesterday (or most recent weekday home). If a respondent responds "0", probe the first two times as to whether or not they heard that particular sound yesterday. If they heard it but were not annoyed code "00". If they did not hear or do not remember hearing that particular sound circle the "20". Note that this probing instruction differs from that on the Q.4 "last year" version of this question.

38-78 SKP
79-80 DUP

Respondents sometimes find this question to be difficult at first (Q.11). Read the question slowly and clearly. If the respondent seems confused slowly repeat the question again.

FIFTH CARD
V
1-5 DUP
6 7
0 5
(8-9)

Q11 Let's look at that zero to 10 annoyance scale again: What is the lowest number you would use and still say you were "highly annoyed"?

SCALE NUMBER ☐☐

Q12 What year did you move into this house?

19 ☐☐ (10-11)

a. [IF 1983] What month did you move in? _____

Q13 Do you own this house or are you renting it? (12)
1. OWN (OR BUYING)
2. RENT

Q14 How many of the people in your household go out to work? ☐☐ (13-14)
(LIST RELATIONSHIP TO RESPONDENT BEFORE ASKING a)

a. Where do each of them work?

RELATION TO RESPONDENT	PLACES OF WORK (DO NOT READ)	
1. RESPONDENT 2. SPOUSE 3. CHILD 4. PARENTS 5. OTHER _____	1.SHIPYARD 2.FT. EUSTIS 3.PATRICK HENRY 4.LANGLEY AFB 5.NASA 6.OTHER (DESCRIBE) _____	(15)(16)
1. RESPONDENT 2. SPOUSE 3. CHILD 4. PARENTS 5. OTHER _____	1.SHIPYARD 2.FT. EUSTIS 3.PATRICK HENRY 4.LANGLEY AFB 5.NASA 6.OTHER (DESCRIBE) _____	(17)(18)
1. RESPONDENT 2. SPOUSE 3. CHILD 4. PARENTS 5. OTHER _____	1.SHIPYARD 2.FT. EUSTIS 3.PATRICK HENRY 4.LANGLEY AFB 5.NASA 6. OTHER (DESCRIBE) _____	(19)(20)

**********SKIP TO PAGE 9**********

Q.14 - Relationship to respondent. If "other" is coded write out relationship, i.e., roommate, landlord, friend.
Places of work - "Other" - If necessary probe for industry and area. There is no need to be more specific (i.e., the answer "works for a dentist in Yorktown" is sufficient). The name of the firm or type or work actually performed is not needed.

FIFTH CARD V

*********SKIP********SKIP TO NEXT PAGE*********SKIP TO NEXT PAGE*********

RECORD THE FOLLOWING OBSERVATIONS AFTER INTERVIEW IS COMPLETED

Q21 SEX OF RESPONDENT

1. Male
2. Female

This information must be completed as soon as possible - certainly before going to the next house. (21)

Q22 ESTIMATED AGE OF RESPONDENT

1. 18-29
2. 30-39
3. 40-49
4. 50-59
5. 60-69
6. 70 or more

This is your own estimate. Do not ask. (22)

Q23 DATE OF INTERVIEW: Month ☐☐ 8(Aug), 9(Sept) (23-24)

Day ☐☐ (25-26)

Q24 FACE SHEET INFORMATION: Number of Adults ☐☐ (27-28)

Number Eligible ☐☐ (29-30)

(Q16) TIME CHART INFORMATION: Obtain from page A.10.

Total hours away for 5 weekdays from 8 am-5 pm ☐☐ (31-32)

	33 M	34 T	35 W	36 T	37 F
A.M. HOME (9-12) ALL	1	1	1	1	1
NONE	2	2	2	2	2
SOME	3	3	3	3	3

See "Extended Question by Question Notes". (33-37)

38-39 SKP

(Q20) TIME END ☐☐:☐☐ Obtain from page A.10. (40-43)

Q25 ACCURACY OF EPISODE TIME REPORTING [ACCURACY OF POOREST REPORT]

1. Within 5 minutes
2. Within 15 minutes
3. Within 30 minutes
4. Poorer than 30 minutes

Use your best judgement. Write out any comments you feel are necessary. Measure accuracy using least reliable episode. (44)

Q26 IF MORE THAN 10 EPISODES RECORD NUMBER ☐☐ (45-46)

47-78 SKP

79-80 DUP

Be sure to copy sample ID from first page. (Pages 9 and 10 will be detached from interview by office staff).

SAMPLE ID ☐☐☐ - ☐☐

This is the end of the interview. What we need now is to make arrangements to find out how you feel about the neighborhood on certain days in September and October.

All we need is for me to telephone you at a convenient time on some days and ask you five questions each time. All together, we will call you about 20 times. It will only take you a few minutes each time, but it will be of considerable help to us. In order to make up for any inconvenience we will give you $40.00 as a token of appreciation.

If you can help us out, we would like to make it as easy as possible for you and find out what the most convenient time is for contacting you in the evening.

D.I.V. - See Extended Question by Question Notes.

Q15 On <u>weekday</u> <u>evenings</u> is there a time when it is particularly convenient to contact you or is anytime between 5:30 and 9:30 all right?
(PROBE IF NECESSARY: Is that the same every evening or are some evenings different?)

1. YES [FILL IN GRID] 2. NO - ALL TIMES SAME

a. Are there any times on some weekday evening when you have a favorite TV show or you are away or there is some other reason why we should not try to contact you? [IF AWAY ALL EVENING, TRY TO OBTAIN TIME JUST BEFORE LEAVES--EVEN IF BEFORE 5:30]

1. YES [FILL IN GRID] 2. NO - ANYTIME OK

b. (Except for those times) ... is it all right to call as late as 9:30 or is that too late? [CIRCLE 9:30 OR WRITE LATEST TIME]

	ALL DAYS SAME FROM-TO	MONDAY FROM-TO	TUESDAY FROM-TO	WEDNESDAY FROM-TO	THURSDAY FROM-TO	FRIDAY FROM-TO
BEST	___ - ___	___ - ___	___ - ___	___ - ___	___ - ___	___ - ___
WORST	___ - ___ REASON: _____ _____	___ - ___ REASON: _____ _____	___ - ___ REASON: _____ _____	___ - ___ REASON: _____ _____	___ - ___ REASON: _____ _____	___ - ___ REASON: _____ _____
LATEST	9:30 ___	9:30 ___	9:30 ___	9:30 ___	9:30 ___	9:30 ___

Q16 Is there any particular weekday when you are usually out away from home at a particular time during the morning or afternoon?

1. YES

a. When is that?
(PROBE: Any other time?)

DAY: _____ FROM ___ :___ TO ___ :___

DAY: _____ FROM ___ :___ TO ___ :___

DAY: _____ FROM ___ :___ TO ___ :___

2. NO

This includes regularly scheduled weekly activities. For anything else you feel has some importance just write it all out in the margin.

Q17 Is there any particular time during the morning or afternoon on most weekdays when you are usually out?

1. YES

a. When is that?
(PROBE: Any other time?)

FROM ___ :___ TO ___ :___

FROM ___ :___ TO ___ :___

FROM ___ :___ TO ___ :___

FROM ___ :___ TO ___ :___

2. NO

This could include car pools, walks or some type of part-time work.

Q18 What is your telephone number?

1. TELEPHONE NUMBER: ___ _____

Q19 Who should we ask for when we telephone you?

NAME _____

Include last name since someone else (either man or woman) may be calling them back.

Those are all the questions for now. I can give you the check for $40.00 right now, if you can give me your full name to write it in here. (TAKE OUT CHECK)

1. FILL OUT CHECK [COPY LAST NAME TO Q19]
2. GET SIGNATURE ON RECEIPT
3. REMIND RESPONDENT TO PUT 0-10 SCALE(S) ON TELEPHONE(S)

Q20 TIME END ____:____

Extended Question by Question Notes

Q6 - Note skip instructions.

The first part of Q6 "Were you at home most of the day today?" is only asked if the interview occurs after 5:00 p.m. This question simply serves to choose the day to be asked about in Questions 7-10. For an evening interview, then the best day will be "today" if the respondent was home most of the day. (Today is "best" because the later telephone follow-up interviews will be about "today"). When an interview is conducted earlier in the day, then the most recent weekday at home is needed so that the respondent's memory is reasonably good. Asking questions 8-11 at this time serves to give face-to-face training to the respondent on questions which must later be administered over the telephone.

Q7 - Episode "1" will always begin with 8:00 a.m. (even if respondent, for example, left home at 7:30 a.m.) Code 1,2, or 3 must be used for each episode. After "time end" time is recorded, take that time and record it in "time begin" for next episode. For example, if in Episode 1 the respondent is indoors from 8:00 a.m. until 10:15 a.m. (enter 10:15 in "time end" box), then episode 2 would have 10:15 a.m. in "time begin" box. The last episode will always end with 05:00 p.m. (even if respondent states a later time for end of episode.) See note at bottom of p. A.4 if more than 10 episodes are to be recorded.

Q15 -- Feel free to write out answers in margins and then fill in grid. You can repeat the information as you fill in the grid. The respondent will be thinking of their week as you do that and you'll both be sure what times are really best. Use probe as stated.

Q15A - If the respondent is away all evening we can make arrangements to call them before leaving if necessary. Complete grids carefully. During the course of the study other interviewers will also be calling these respondents and this information must be clear to them.

Q16 (p. A.8) - Refer to Q16 and Q17 on page A.10. Add up the total number of hours respondent plans to be away each week. Put total in boxes. Example - Children's car pool 12:00-1:00 each weekday and volunteer work 9:00-12:00 Wednesday and tennis 24 Tues. and Thurs. would total 12 hours. A.M. home (page A.8) - Refer to Q16 and Q 17 on page A.10 and circle one code for each day using this information. 9:00a.m. 12:00 noon only will be used for this chart.

D. Contact Preceeding Interview Using Respondent Selection Sheet

After receiving assignments of approximately fifty addresses, each interviewer will prepare one "Respondent Selection Sheet" with the appropriate address and "Sample ID" for each address. This sheet is the primary document for tracing the survey process. Interviewers are required to turn in one sheet for each address. The front page will be filled out at each house before beginning the standard interview.

The first few minutes at each address are of considerable importance. The first tasks are to secure the informant's cooperation and to screen the address to determine whether anyone in the house is eligible for participation in the study. The Respondent Selection Sheet will help in this task.

The suggested introduction at the top of the Respondent Selection Sheet can be used word for word, or interviewers can use a similiar introduction with which they feel more comfortable. It is generally best to be able to sit down and conduct the rest of the process indoors at this point. If the respondent seems hesitant it may be useful to show them a picture ID or point to the letter. In rare instances it may be necessary to conduct the whole interview standing up at the door.

Any responsible adult from the household can answer the questions. If only a child is home, ask when the parents will be back and have an extra copy of the mailed letter with a note "I tried to reach you at 10:00 this morning. I will call again later. John Q. Interviewer".

After you are sitting down read the two lines below the asterisks. The second sentence is required for legal purposes. Every adult should be entered on a line under "Relationship to Informant". Do not automatically assume you know what the relationship is. "Friend, roommate, etc." are acceptable.

After all people are listed, ask all relevant questions (A,B,C, and/or D) before going to the next person. If a person is found to be ineligible on some grounds, circle "2.NO" under criteria and in the "OUTCOME OF ELIGIBILITY" box and ask no more questions about that person. Go on to ask A about next person.

If several people are eligible ("1.Yes" circled under OUTCOME OF ELIGIBILITY) then write in only the first name for each and select the person whose name is first in alphabetical order.

Put an "X" under "SELECTED" for the selected person even if there is only one eligible person in the household.

The "CALL BACK AND FACE SHEET DISPOSITION RECORD" on the back of the "RESPONDENT SELECTION SHEET" is an important record. Be sure to fill out one line each time an attempt is made at an address. While it is good practice to go ahead and check an address more than once on each visit to an area, it is important to plan area visits so as to vary the time of day of the call and increase the chances someone will be home.

When an address is finally finished (interview or otherwise) be sure to circle the appropriate answers at the bottom of the page and copy the information to the coding boxes at the top of the first page.

While securing people's cooperation is usually routine, this can occasionally be a difficult task which requires all the skill and sensitivity an interviewer has available. In general the interviewer only needs to be confident but sensitive to the respondents' feelings. The assumption is that an interview can be conducted immediately, but if the person really is on the way out, then a return visit can certainly be planned.

An effort should be made to avoid a flat refusal. When an informant appears to be uncomfortable with the interviewer or a refusal seems forthcoming for any reason, quickly conclude the screening and "leave the door open" for further contacts by a converter. (A converter is an interviewer experienced in obtaining difficult interviews).

Explanation of Column headings in "CALL BACK" record

Call by (Int-ID)

Be sure to include interviewer ID# in proper column. More than one interviewer will be working on some of the cases

Outcome of Call

NO CONTACT - no one home

NO SAMPLE INFO - Spoke with someone but they could not give screening information at that time (i.e. person refuses, talked with child or guest). Write out all problems or concerns - use as much space as needed.

ELIGIBLE BUT NOT CONTACTED - Selection process was completed but the selected respondent was not contacted and the interviewer must return at a later time.

ELIGIBLE BUT NO INTERVIEW - The selected respondent states he/she cannot do interview at that time. An appointment should be set up for another time.

SUGGEST RETURN AT - Probe for a convenient time, not a day or time when respondent would be rushed. Also, feel free to suggest a time or times convenient to the interviewer. If the respondent suggests a time not convenient for the interviewer, make the appointment and call the office immediately so that another interviewer may go.

COMMENTS -------- Write out all information on all contacts. This will be helpful in deciding how to handle the case in the future and will make it easier for any cases transferred to a different interviewer.

E. Answering Respondents' Questions

The respondent letter and the standard instructions printed in the "Respondent Selection Sheet" and "Environmental Survey" will provide all the information most respondents want about the study. Occasionally respondents will ask additional questions. These should be answered as directly and as briefly as possible before the questionnaire is finished. Brief answers to some typical questions are given below. Long discussions before the data collection is completed are likely to bias responses and heighten the possibility of a refusal.

If a respondent wishes to have more information than can be briefly supplied, politely suggest that you should finish the interview first and then talk about those issues in more detail. ("We can talk about that at the end, but I need to finish asking these questions first.") Then answer questions as best you can after the interview. If the respondent says he would like to find out more about the study generally, ask if he would like to receive a final report on the study and tell Suzanne so that we can mail a final report. If there is a specific question which can not be answered to the respondent's satisfaction and which must be answered before the study is completed in November, explain that you do not know the answer and ask them if they need to have the study director telephone them. Give their name and telephone number to Suzanne so that Dr. Fields can telephone them.

Some typical questions and possible direct answers

Q1. What is this study all about?

A. We are getting information about what things people like and dislike about their neighborhood environment.

Q2. Why are they studying this area?

A. It was chosen by the statisticians because it is fairly typical for suburban areas.

Q3. Why talk to me, other people know more?

A. To have a good representative study, we need to find out how all kinds of different people feel.

Q4. Why are you asking about noise in such a quiet area?

A. These surveys are being conducted in many types of areas. Sometimes a few more typical quiet areas are included just to give a basis for comparison.

Q5. Are you selling something?

A. No. This is strictly a research interview being done for the Department of Transportation.

Q6. Why don't you ask about noise at night, that is what bothers me?

A. There have been other surveys about night noise. We only ask about day-time noise because that is when the noise measurements are made.

Q7. What use is it going around asking all these questions?

A. This is the only way to find out how most people really feel about things.

Q8. Isn't this just another waste of government money which will lead to more government regulation?

A. The situation is that there are many local communities which are asking the government to do something about environmental nuisances. No one knows whether there should be rules unless we have this kind of information about how people feel.

Q 9. Does this have anything to do with ...(some local issue: noisy garbage trucks, boats on the river, a construction project, Patrick Henry, etc.).

A. No. This does not have anything to do with any local issue. It is only being used for national level policy.

Q10. Is anyone going to be able to tell how I answer this?

A. Your answers are strictly confidential. The answers will only be presented in statistical form.

Q11. I am afraid that information about when I am at home would get into the wrong hands.

A. We are very careful with all our information. That particular information is stored seperately in a specially locked cabinet.

Q12. How do I know you aren't here as part of a burglary team?

A. You have our letter and here is my picture identification card. (Also welcome to call Bionetics office).

Q13. Do you mind if I call the police?

A. No. If you do though, please refer to this letter which has been mailed to the police department. (Show letter).

Q14. What did my neighbor Mrs. Whatsit say about that?

A. We have assured everyone that their answers will be confidential, so I'm afraid I couldn't discuss anyone else's answers even if I could remember them.

F. Daily Summary Record

Each interviewer must fill out a column in the Daily Summary Sheet for each interviewing day and then report the results to the supervisor as is indicated in the schedule.

The sample ID number should be written on the correct line when the address assignment is given. Each cell in the first half of the table will contain two entries seperated by a diagonal: (1) the number of calls made on this day/(2) a code for the current status of the address (the acceptable codes are presented below in the Cumulative Summary Column: I,O,Y,N,D). Leave the cell blank if no attempt to contact the address has yet been made. All the information on this sheet must be consistentwith the information on the respondent selection sheets.

Definition of Address Status

Interviews (I)

Non-interviews. (O) Addresses which have been finally disposed of because no one was eligible, refusal, or some other reason. Anyone who gave an interview but refused to participate in the follow-up is to be coded as non-interview.

Not tried. (Blank) These are houses where the interviewer has not yet gone to the door. As soon as the interviewer has rung the door bell once, the house goes into another category. The space is left blank for this "Not tried" category.

Still trying. (Y,N,D) The three categories under the "Still trying current guess is" heading are for addresses which have been approached but not yet disposed of. If there is no

information about whether or not an eligible person is in the household then the person should be coded "Don't know" (D). If some information from informants in the household or any other source is available, then it may be possible to guess as to whether or not there is an eligible person in the household.

When the "Respondent Selection Sheet" is finally returned to the supervisor then the date on which it was returned should be written in the "Date of Turn-In" column and a check should be put in the appropriate "Final Outcome" column. "No Int." again includes the unusual case when a person gave an interview but refused to participate in the follow-up. (Mark any such case clearly.) The "Convert" category is used for addresses which were returned to the supervisor for reassignment to another interviewer.

The "Cumulative Summary Box" is needed to give the study director a comprehensive overview of the current project status. The number of interviews will thus gradually increase as the interviewing period progresses while the "Not Tried" category will be zero after a few days.

The remaining information is primarily used as part of the supervision process. "Today's Summary" will thus contain the number of interviews and calls actually carried out on the particular specified day. The "Time for Day" and "Mileage for Day" Columns will provide the basic information for filling out the official expense claim and time sheets.

G. Project Personnel:

Suzanne Bard - Interviewer Supervisor
Home telephone:
Work location:
Field Interviewing Period (Aug 31 to Sept 13)
Building 1208, Room 107, Telephone 865-3659
Remainder of Study: (Before Aug. 31 and after Sept. 13)
Building 1208, Room 121, Telephone 865-3561

Jim Fields: Study Director
Home telephone:
Work location: Building 1208, Room 121, Telephone 865-3561

Jerome Meyers - Contract Manager
Work telephone:

Interviewers are encouraged to call Suzanne Bard or Jim Fields after hours or on weekends if they have not been able to make routine, required reports during office hours or if problems arise outside of normal office hours.

H. Study Materials

the bionetics corporation

20 RESEARCH DRIVE
HAMPTON, VIRGINIA 23666
TELEPHONE. (804) 865-0880

17 August 1983

Darrel W. Stephens, Chief
Newport News Police Department
224 26th Street
Newport News, VA 23607

Dear Chief Stephens:

Interviewers from the Bionetics Corporation will be conducting opinion research interviews for the United States Department of Transportation in the upper area of Newport News from August 30 to September 30, 1983. A copy of the letter which is being sent to selected residents is enclosed for your information.

If any questions arise concerning our interviewing activities in the area, please feel free to contact me.

Sincerely yours,

James M Fields

James M. Fields, Ph.D.
Research Sociologist
Bionetics Corporation

Interviewer [ ][ ] DAILY SUMMARY

Face-to-face interview record and selection sheet control

Sample - No	Cell contents = No. of Calls / Status Code																	Final Outcome (√)			Date of turn-in
	30 Tu	31 W	1 Th	2 Fr	3 Sa	4 Su	5 M	6 Tu	7 W	8 Th	9 Fr	10 Sa	11 Su	12 M	13 Tu	14 W	15 Th	16 Fr	Inter view	Not Int.	Con- vert	
1																						
2																						
3																						
4																						
5																						
6																						
7																						
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44																						
45																						

Sample - No	[Cell contents = No. of Calls / Status Code] 30 Tu	31 W	1 Th	2 Fr	3 Sa	4 Su	5 M	6 Tu	7 W	8 Th	9 Fr	10 Sa	11 Su	12 M	13 Tu	14 W	15 Th	16 Fr	Final Outcome (✓) Interview	No Int.	Convert	Date of turn-in
46																						
47																						
48																						
49																						
50																						
51																						
52																						
53																						
54																						
55																						
56																						
57																						
58																						
59																						
60																						

Cumulative Summary to Date of Address Status (Code in parentheses is for use above)

Interviews (I)	
Non-Interview (O)	
Not Tried (blank)	
Still trying current guess is: Yes(Y)	
Still trying current guess is: No(N)	
Still trying current guess is: DK (D)	
Total Check	

Today's Summary - Number of:

Interviews	
Calls	

Time for Day (Hours /Minutes)

From	
To	
From	
To	
Total	

Mileage for Day

Begin	
End	
Total	

Repeated Telephone Interviewing Instructions

(The daily instructions which related to purely administrative matters are not included.)

Detailed Question by Question Instructions for Repeated Telephone Interviews

Detailed question by question instructions are written on the interview form on the next four pages. Some longer notes are presented on this page.

Introduction on Telephone

"Is this Miss/Mrs./Mr. _____? This is Miss/Mrs./Mr. _____ from The Bionetics Corporation calling about the environmental study. Is this a good time to talk for a couple of minutes".

The First Section before Interview

Only the interviewer who completes the interview should fill in "CONTACT DATE", "INTERVIEWER" ID, "IS THIS INTERVIEW" and "TIME START". Fill in these items after interview.

Q.4 Introduction to Ten Point Scale For the First Night

"Now we are going to use that zero to ten point scale we gave you at the first interview .. Do you have it near your telephone so we can look at it now?"

Closing of Interview

"Thank you again for your help. We will be calling you again soon."

Special Instructions For the First Night Of Interviewing

1. Introduce self. Is this good time?
2. Complete interview.
3. Review the best times to call from yellow sheet. Get as wide a range if possible.
4. Edit, make necessary notes and turn in to Suzanne before doing another interview.

****** REPEATED TELEPHONE QUESTIONNAIRE ****** dot-short-q RB

Approved for use through 04/30/85
O.M.B. No. 2120-503

Do not fill in until interview is completed.

INTERVIEW 1 2 3 (PERSON) 4 5 (SERIAL) 1 0

CONTACT DATE: 9 Sept. 10 Oct. MO. / DAY

INTERVIEWER

IS THIS INTERVIEW 1. Same day 2. Yesterday 3. Non-int

TIME START 1. AM 2. PM

See notes.

(1) DO NOT RECORD EVENTS OF LESS THAN 10 MINUTES AS A SEPARATE EPISODE
(2) COUNT TIME SPENT AT NEARBY NEIGHBORS (within 3 houses) AS "TIME AROUND HOME"

FIRST CARD III 6 7 [0 3]

(8-11)

(12-13)

(14)

(15-18)

(19)

Q1 We again need to find out whether you were around home today from 8:00 in the morning until 5:00 in the afternoon. Starting at 8:00 were you at home or away from home?

REPEAT FROM HERE FOR EACH EPISODE. RECORD FIRST EPISODE UNDER "EPISODE 1"

a. So at ...(8:00) ...you were ...

1. Away from home

b What time did you get back home?

RECORD IN "TIME END" BOX AND START NEW EPISODE

A. Around home

c. Were you indoors or outdoors at ... (8:00) ...?
2. OUTDOORS
3. INDOORS

d. What time did you then go back in-doors or leave the area?

RECORD IN "TIME END" BOX AND START NEW EPISODE

e. Did you go outdoors or leave home (again) later in the day?
B. NO — RECORD "5.00" IN "TIME END" BOX AND GO TO NEXT QUESTION
C. YES — f. What time was that? — RECORD TIME IN "TIME END" BOX AND START NEW EPISODE

-B.1-

(New instruction.)

	TIME BEGIN	1. AWAY	AROUND HOME: 2. OUTDOORS / 3. INDOORS	TIME END	FIRST CARD III
EPISODE 1	8:00				(20) (21-24)
EPISODE 2	:				(25) (26-29)
EPISODE 3	:				(30) (31-34)
EPISODE 4	:				(35) (36-39)
EPISODE 5	:				(40) (41-44)
EPISODE 6	:				(45) (46-49)
EPISODE 7	:				(50) (51-54)
EPISODE 8	:				(55) (56-59)
EPISODE 9	:				(60) (61-64)
EPISODE 10	:				(65) (66-69)

[IF AWAY ALL DAY FILL EPISODE 1 AND END INTERVIEW]

[IF MORE THAN 10 USE SUPPLEMENTAL PAGE AND CHECK HERE ☐]

If more than one nap write out all information for each nap.

Q2 Did you sleep or try to take a nap during the day?

1. YES

a. What time was that?

BEGIN: [| | |]

END : [| | |]

2. NO

Q3 Did you have any of the windows open in your house today?

YES - OPEN

a. In the rooms you were in were the windows open or closed most of the time?

3. MOSTLY OPEN
4. MOSTLY CLOSED

2. NO - ALL WERE CLOSED

Just circle number codes for questions 2 and 3.

FIRST CARD III

70-78 SKP

79 80

[|]

SECOND CARD IV

1-5 DUP

6 7

[ ]

(8)

(9-12)

(13-16)

(17)

See notes.

*CHECK IF SCALE NEAR TELEPHONE FIRST TIME

We are going to rate (today's) neighborhood sounds on your scale* which goes from 0, if you were "not at all annoyed" to 10 if you were "extremely annoyed." Remember to take into account both how many times you heard a sound as well as how much it bothered you when you did hear it. If you do not remember hearing sound (today) don't rate it and I will mark it as "not heard."

Q4 When you were at home during the day (today) how much were you bothered or annoyed by the noise from . . . . . (cars) . . . ?

	RATING	NOT HEARD	
a. Cars	[	]	20 (18-19)
b. Trucks	[	]	20 (20-21)
c. Motorcycles	[	]	20 (22-23)
d. Jet airplanes	[	]	20 (24-25)
e. Helicopters	[	]	20 (26-27)
f. Small propeller airplanes	[	]	20 (28-29)
g. Neighbors' tools or yard equipment	[	]	20 (30-31)
h. Is there any other noise which bothered or annoyed you around here today? (DESCRIBE ALL. CIRCLE WORST.)			20 (NONE) (32-33)

Probe the first two "0"'s as to whether or not they heard the sound.

i. IF YES How much did it bother you? [|]

SECOND CARD IV

34 35 36 37

[| | |]

SKP 38-39

(40-43)

TIME END [| | | |]

FILL OUT AFTER INTERVIEW

ACCURACY OF EPISODE TIME REPORTING [ACCURACY OF POOREST REPORT]
1. Within 5 minutes 3. Within 30 minutes
2. Within 15 minutes 4. Poorer than 30 minutes (44)

IF MORE THAN TEN EPISODES RECORD NUMBER [|] (45-46)

IF NO INTERVIEW: DISPOSITION CODE [FROM FOLLOW UP RECORD] [ ] (47)

To be completed by Suzanne.

WAS R HOME 8 AM to 5 PM? 1. YES 2. NO 3. DK (48)

49-78 SKP
79-80 DUP

ADDITIONAL NOTES FOR TELEPHONE INTERVIEW PERIOD (9/19/83)

General Interviewing Technique

As was explained in the training period, it is essential that a uniform interviewing technique be used to obtain unbiased responses from all respondents. Interviewers must use the exact wording written in the questionnaire except in unusual circumstances. Most interviews should require no departure from the interview script except for a possible probe on the type of "other" noise (see below) or on the details of a complex set of episodes. With this short an interview, there is not usually any reason to add any connecting phrases.

Interviewers must NOT provide any feedback on responses other than purely neutral comments such as "I see" or "That is interesting", etc. The following type of interviewer comments are absolutely UNACCEPTABLE: "Lots of people are telling us they heard that noise today; that noise is a big problem, isn't that an awful noise, did you hear the sirens." Interviewers must refrain from any general discussion about noise or the neighborhood environment.

The only item in Question 4 which might require probing is the "other" item (Q4h). If the description of the noise source is unclear (i.e. "sirens" or "the motors") then a probe of "What sirens/motors are those?" is needed. Do not assume that, for example, all "siren" responses refer to the Surry sirens, a few people may well be refering to emergency vehicles. Interviewers should even refrain from discussing the noise sources among one another during the evening period since their voices may be audible to respondents who are on the phone.

Specific problems in filling in interview forms

The most frequently overlooked items are:

a. Indicating the day "IS THIS INTERVIEW..." on the first page
b. Circling a response for "AM" or "PM" on the first page
c. Indicating the "Accuracy of Episode" on the last page

Key punching of the interviews will be aided by

a. Writing legibly
b. Circling only numbers: i.e. Do not circle the "YES" answer in Q3: if windows are open, circle only the number "3" or "4".

Recording volunteered statements

Any additional comments which respondents volunteer about any of the noise sources in Question 4 should be written verbatim in the margins. Do not probe or discuss such volunteered comments. These comments are important; they need to be accurately recorded.

Obtaining information relevant to call-backs on future study days

Begin each evening contact with the interview. Save any polite conversation or discussion of future schedules until after the standard interview.

Just mention that "We will be calling again soon" but do not mention a particular date. We are never certain about the date and we do not want people to think about noise on only the particular days we call. Any new information about best times to call should of course be recorded on the "Follow-up Record".

Follow-up record

The "Follow up Record" sheet must be meticulously maintained so that anyone else can pick up your folder and do the interviews if you are ill and unable to come in some evening. Such important information must be on this record and not on the yellow sheet or the outside of the folder.

Be sure and fill in "Date", "Day", and "Interviewer ID for evening" on the Follow up Record (not on the interview) before beginning the call. If the interview is obtained or if it is determined that the respondent was definitely away all day or can not be reached, then the "Final result" (bottom of page) can be coded as well as the outcome of each call.

If the respondent is not interviewed.

If the respondent is not interviewed and it is definate that the respondent was not at home during the entire day (e.g. spouse says respondent has left to go out of town previous day), then fill out only the "INTERVIEWER", "IS THIS INTERVIEW...", (front of interview; and "IF NO INTERIVEW" (back of interview) boxes on the interview form.

It is necessary to fill in the last line of the interview form ("WAS R HOME 8 to 5 PM?") if there was no interview. If respondent is not at home be sure to specifically ask "Was .... (study respondent) at home at all from 8:00AM to 5:00PM today?". Be sure to ask when ever there is any ambiguity at all. (Example: Spouse says that the respondent has gone out of town for two weeks but does not specifically say whether the respondent left home before or after 8:00AM today).

Organizing call-back work

Calls will go smoothly if the folders are well organized. The best system would seem to be to organize the folders by the time at which they are to be called.

Give Suzanne any non-interviews or unusual cases as soon as you finish them. Do not let more than five standard completed interviews pile up before giving them to Suzanne.

Getting along in a small space

1. Please do not smoke in the telephone room.
2. Please keep you voice low enough so that you can not be heard on other phones.

ADDITIONAL NOTE #2 FOR TELEPHONE INTERVIEW PERIOD (9/22/83)

Add the following message to the end of each telephone interview for this day (Serial Day 5). Then modify the requested call back times if necessary on the "FOLLOW UP" record.

That is all for tonight. We do want to thank you because you're giving just the sort of information which is important for this study. Let me just check on our calling procedure. When you were interviewed at home we explained that you would be called about 20 times. So we will still be calling you 3 or 4 times a week over the next 5 weeks or so. Is the time we have been calling you still OK or should we call at a different time? (CHANGE FOLLOW UP RECORD IF NECESSARY). . . . . .Thank you again. We will be calling you again soon.

ADDITIONAL NOTE #3 FOR TELEPHONE INTERVIEWING PERIOD (9/26/83)

1. Question 2 should count as a nap any sleeping after 8:00 by people who get up after 8:00 in the morning. Include the following phrase after the respondent has given an answer to Question 2. Ask this additional probe only tonight (Monday, Sept. 26, 1983, Day 6).

   "I need to check on one more thing. This question always includes trying to sleep after 8:00 in the morning. Did you try to sleep after 8:00 this morning?"

   (AFTER ANSWER SAY.....)

   "If you ever do get up after 8:00 do be sure and tell us."

2. Some problems which have come up regarding the classification of sounds should continue to be handled in the following way:

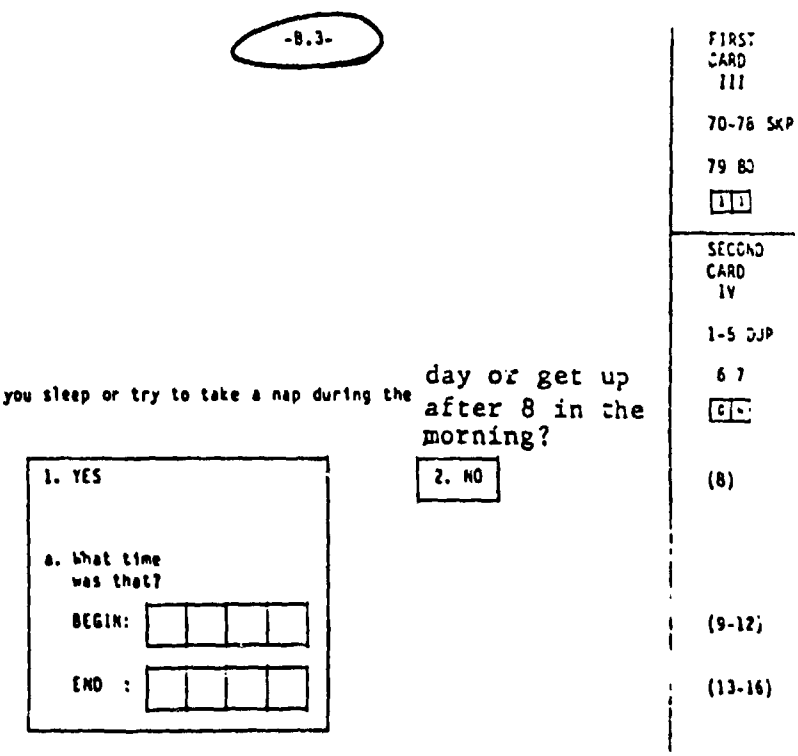
   Q.4 b. Trucks include..."Garbage trucks..."
   d. Jet airplanes include..."Small jets (Lear jets)"
   g. Neighbor's tools or yard equipment include..."Neighbor working on car"
   h. Other include..."School bus"

ADDITIONAL NOTE #4 FOR TELEPHONE INTERVIEWING

PERIOD (10/3//83)

Add the phrase "or get up after 8:00 in the morning" to question 2. i.e. ....

"Q2 Did you sleep or try to take a nap during the day or get up after 8:00 in the morning?"



ADDITIONAL NOTE #5 FOR TELEPHONE INTERVIEWING
PERIOD (10/11/83)

We need to tape record some of the interviews. These recorded interviews are very useful when we sometimes try to go back and understand aspects of the responses which are not clear from the written interviews. The procedure for recording the interviews is as follows:

1. Attach black disk to the ear end of the headset and be sure the other end is plugged into the "MIC" input on the tape recorder.

2. Fill in the following items on the "TAPE#" sheet before you pick up the telephone:
   Date:
   Serial Day:
   Interviewer ID:
   Respondent ID:
   Tape Counter Start:

3. Record the respondent information on the tape:
   a) Pick up phone.
   b) On the tape recorder press the two marked keys simultaneously so they latch down.
   c) Say "This is respondent number XXX on Day XXX".
   d) Stop the recorder.

4. IF NO PERMISSION YET REQUESTED:
   a) After completing step 3 above, dial the number.
   b) Go through normal procedure to be sure this is the best time for an interview.
   c) Read the following message "I need to have my supervisor and the study sponsors listen to some of my interviews. Would it be alright if we tape record them occasionally?"
   d) THEN, IF AGREES TO TAPE RECORDING:
      1. Turn on tape recorder
      2. Conduct interview
      3. Remember to write "PERMISSION TO TAPE RECORD" in green in the top box of the "FOLLOW UP RECORD"
   e) IF NOT AGREE:
      1) Conduct interview as usual
      2) Mark "TAPE RECORDING REFUSED" on "FOLLOW UP RECORD"

5. IF PERMISSION PREVIOUSLY GRANTED ON "FOLLOW UP RECORD": Switch on the recorder when you ask the first question.

(4)

6. At end of an interview or end of unsuccessful attempt to locate respondent:
    a) Switch tape recorder off (push STOP button).
    b) Enter number in "tape counter finish" column of data sheet.
    c) Mark "Yes" or NO under "Interview Conducted" column
    d) If an interview, put down any extra information about the interview under "Comments". Be sure to make a note if the respondent has elaborated on his/her feelings about any noise source. Make a note if the respondent provides any information about feelings about the survey or about the noise rating procedure. Also note any unusual aspects of the respondent or interview process.

ADDITIONAL NOTE #6 FOR TELEPHONE INTERVIEWING

PERIOD (10/12/83)

To be sure that people are reporting all their episodes, even if they are as short as 10 minutes, we need to insert the following phrase in Q1 for one night:
"Be sure to mention anytime longer than 10 minutes when you were away from here or outdoors."

Question 1 now reads:

Q1 WE AGAIN NEED TO FIND OUT WHETHER YOU WERE AROUND HOME TODAY FROM 8:00 IN THE MORNING UNTIL 5:00 IN THE AFTERNOON. Be sure to mention anytime longer then 1(minutes when you were away from home or outdoors. STARTING AT 8:00 WERE YOU AT HOME OR AWAY FROM HOME?

NOTE:
1) Use this new version only one night. Under the last call on the Follow Up Record, write "ASKED 10 MIN.", so that the message will not be repeated with the same respondent another day.
2) Read the question <u>exactly</u> as given above. Do <u>NOT</u> give your own explanation.

ADDITIONAL NOTE #7 FOR TELEPHONE INTERVIEW PERIOD

(10/19/83)

(1) Read the following message at the end of each telephone interview for this day (Serial Day 16). Then modify the requested call back times if necessary on the "FOLLOW UP" record.

"That is all for tonight. We do appreciate your continuing help on this study. It really is valuable.

We thought you would like to know that so far everything is going well on this study. We are about 2/3rd's of the way through now and will finish in early November. We want to be sure again that we are making it as easy as possible for you. Is the time we have been calling you still OK or should we call at a different time; we could call as early as (5:00) if necessary. (CHANGE FOLLOW UP RECORD IF NECESSARY). . . . . Thank you again. We will be calling you again soon."

(2) Indicate that you have read this message on the Respondent's FOLLOW UP Sheet.

(3) If the respondent is concerned or upset about how long the study is going to last, attach a note (include Respondent ID Number) to the folder and explain the situation.

ADDITIONAL NOTE #9 FOR TELEPHONE INTERVIEW PERIOD
(11/1/83)

Note concerning accuracy of reporting ratings.

On the "ACCURACY OF TIME REPORTING" rating at the end of the interview, only use "Within 5 minutes" when you are positive the respondent is being completely accurate.

ADDITIONAL NOTE #10 FOR TELEPHONE INTERVIEW PERIOD

(11/8/83)

The next to the last interview asks about one day and the night preceeding that day. When the interviews have been conducted the next morning rather than during the standard evening period then the wording of the 24 hour time period questions needs to be changed as is indicated below:

Q5 Now we have something a little different. In this interview we need to also ask about the evening and night-time beginning on Sunday afternoon at 5:00. First we need to find out whether you were around home from 5:00 in the afternoon on Sunday until 8:00 in the morning Monday. Starting at 5:00 Sunday afternoon were you at home or away from home?

Q6 What time did you go to bed Sunday night and get up yesterday morning?

Q7 Did you have any of the windows open in your house during the evening or night on Sunday?

We are going to rate all the neighborhood sounds on you scale for the entire 24 hours which goes from 5:00 Sunday afternoon to 5:00 yesterday. This includes Sunday evening and night as well as the time we already asked you about on Monday. Remember to take into account both how many times you heard a sound as well as how much it bothered you when you did hear it. If you do not remember hearing a sound either Sunday night or yesterday don't rate it and I will mark it as "not heard."

Q8 When you were at <u>home</u> during the 24 hours from Sunday afternoon to 5:00 yesterday afternoon how much were you bothered or annoyed by the noise from . . . . (cars) . . . ?

h. Is there any other noise which bothered or annoyed you around here Sunday evening or night? (DESCRIBE ALL. CIRCLE WORST OF DAY (Q4) AND NIGHT)

_____

Concluding Telephone Interviewing Instructions

******CONCLUDING TELEPHONE QUESTIONNAIRE ****** dot-end-q 89

Approved for use through 04/30/85
O.M.B. No. 2120-503

Start interview exactly as normal. Do not mention length of interview or "last call" until indicated on page C.5.

INTERVIEW [ ][ ][ ] [2][6]
PERSON SERIAL

CONTACT DATE: 9 Sept. 10 Oct. [ ][ ] / [ ][ ]
MO. DAY

INTERVIEWER [ ][ ]

IS THIS INTERVIEW 1. Same day
2. Yesterday
3. Non-int

TIME START [ ][ ][ ][ ]
1. AM
2. PM

FIRST CARD 111 6 7 [0 1]
(8-11)
(12-13)
(14)
(15-18)
(19)

(1) DO NOT RECORD EVENTS OF LESS THAN 10 MINUTES AS A SEPARATE EPISODE
(2) COUNT TIME SPENT AT NEARBY NEIGHBORS (WITHIN 3 HOUSES) AS "TIME AROUND HOME."

Q1 We again need to find out whether you were around home today from 8:00 in the morning until 5:00 in the afternoon. Starting at 8:00 were you at home or away from home?

REPEAT FROM HERE FOR EACH EPISODE. RECORD FIRST EPISODE UNDER "EPISODE 1"

a. So at ...(8:00) ...you were ...

1. Away from home

b. What time did you get back home?

RECORD IN "TIME END" BOX AND START NEW EPISODE

A. Around home

c. Were you indoors or outdoors at ... (8:00) ...?
2. OUTDOORS
3. INDOORS

d. What time did you then go back indoors or leave the area?

RECORD IN "TIME END" BOX AND START NEW EPISODE

e. Did you go outdoors or leave home (again) later in the day?
B. NO
C. YES

RECORD "5:00" IN "TIME END" BOX AND GO TO NEXT QUESTION

f. What time was that?

RECORD TIME IN "TIME END" BOX AND START NEW EPISODE

	TIME BEGIN	1. AWAY	AROUND HOME 2. OUTDOORS	AROUND HOME 3. INDOORS	TIME END	FIRST CARD 11'
EPISODE 1	8:00					(20) (21-24)
EPISODE 2	:					(25) (26-29)
EPISODE 3	:					(30) (31-34)
EPISODE 4	:					(35) (36-39)
EPISODE 5	:					(40) (41-44)
EPISODE 6	:					(45) (46-49)
EPISODE 7	:					(50) (51-54)
EPISODE 8	:					(55) (56-59)
EPISODE 9	:					(60) (61-64)
EPISODE 10	:					(65) (66-69)

[IF AWAY ALL DAY FILL EPISODE 1 AND GO TO Q5]

[IF MORE THAN 10 USE SUPPLEMENTAL PAGE AND CHECK HERE ☐]

Q2 Did you sleep or try to take a nap during the day?

1. YES

a. What time was that?

BEGIN: | | | | |

END : | | | | |

2. NO

Q3 Did you have any of the windows open in your house today?

YES - OPEN

a. In the rooms you were in were the windows open or closed most of the time?

3. MOSTLY OPEN
4. MOSTLY CLOSED

2. NO - ALL WERE CLOSED

FIRST CARD III

70-78 SKP

79 80

| 1 | 1 |

SECOND CARD IV

1-5 DUP

6 7

| 0 | * |

(8)

(9-12)

(13-16)

(17)

We are going to rate (today's) neighborhood sounds on your scale which goes from zero, if you were "not at all annoyed" to 10 if you were "extremely annoyed." Remember to take into account both how many times you heard a sound as well as how much it bothered you when you did hear it. If you do not remember hearing a sound (today) don't rate it and I will mark it as "not heard."

Q4 When you were at home during the day (today) how much were you bothered or annoyed by the noise from . . . . . (cars) . . . ?

	RATING	NOT HEARD	
a. Cars		20	(18-19)
b. Trucks		20	(20-21)
c. Motorcycles		20	(22-23)
d. Jet airplanes		20	(24-25)
e. Helicopters		20	(26-27)
f. Small propeller airplanes		20	(28-29)
g. Neighbors' tools or yard equipment		20	(30-31)

h. Is there any other noise which bothered or annoyed you around here today? (DESCRIBE ALL. CIRCLE WORST)

00 (NONE) (32-33)

i. IF YES How much did it bother you? | | | (34-35-36-37)

SECOND CARD IV

38-78 SKP
79-80 DUP

See note on bottom of this page.

THIRD CARD
VII
1-5 DUP

6 7
0 7

This is the last time we will be calling so I have a few extra questions now.

Q5 These questions are about this past year, not just today. Taking everything into consideration, how would you rate this neighborhood as a place to live? Would you say it is excellent, good, fair, or poor?

8-16 SKP

1. EXCELLENT
2. GOOD
3. FAIR
4. POOR

Emphasize past year!

(17)

Now think about the noises during this whole past year. We need to use the same zero to ten scale to rate how bothered or annoyed you were by each sound this last year and not just today. Take into account both how often you hear the sound and how much it bothers you when you do hear it. If you have never heard some sound around here tell me, but if you ever hear it, rate it somewhere from zero to ten.

Q6 Thinking about this last year, how do you feel about the sounds from ...(cars)... around here? How much have they bothered or annoyed you?

	RATING	DO NOT HEAR	
a. Cars	☐☐	20	(18-19)
b. Trucks	☐☐	20	(20-21)
c. Motorcycles	☐☐	20	(22-23)
d. Jet airplanes	☐☐	20	(24-25)
e. Helicopters	☐☐	20	(26-27)
f. Small propeller airplanes	☐☐	20	(28-29)
g. Neighbors' tools or yard equipment	☐☐	20	(30-31)

h. Are there any other noises which bother or annoy you around here? (DESCRIBE ALL. IF MORE THAN ONE CIRCLE MOST ANNOYING AND RATE IN "i") _____ 20 (NONE)

_____

_____

i. IF YES How much does it bother or annoy you? ☐☐ (32-33)

Appt. or best time to call should be obtained for later call back if this is a bad time to proceed.

34 35 36 37
☐☐☐☐

38-39 SKP

THIRD CARD VII

Q7 Now another question about how annoying the noise from cars was around here this last year. Would you say the noise from cars was not at all annoying, slightly annoying, moderately annoying, very annoying, or extremely annoying?

1. NOT AT ALL
2. SLIGHTLY
3. MODERATELY
4. VERY
5. EXTREMELY

(40)

41-47 SKP

Q8 Let's look at that zero to ten annoyance scale again: What is the lowest number you would use and still say you were "highly annoyed"?

SCALE NUMBER ☐☐

(48-49)

50-78 SKP
79-80 DUP

Q.8 - 1. A few respondents might be concerned or try to remember what they answered last time. Just pause and/or repeat the question. We are interested in "now".

2. Read question slowly as it is sometimes hard for a respondent to understand.

FOURTH CARD
VIII
1-5 DUP

The next questions ask about the time since the middle of September when we have been calling you.

Q8 In terms of the amount of time you spend at home, how typical have these weeks been when we called you? Would you say you have spent more time than usual at home, less time than usual, or about the usual amount of time at home?

6 7 [0 8]

1. MORE AT HOME
2. LESS AT HOME
3. USUAL

Read slowly. Probe, if necessary:
"In general..."
"For this time of the year..."

(8)

Now think about the noises during this 8-week period when we have been calling you. We need to use the same zero to ten scale to rate how bothered or annoyed you were by each sound during this period.

9-17 SKP

Q9 Thinking about this 8-week period while we have been calling you, how did you feel about the sounds from ...(cars)... around here? How much did they bother or annoy you?

If away for part of the 8 weeks it means the time they were here.

	RATING	DO NOT HEAR
a. Cars	☐☐	20
b. Trucks	☐☐	20
c. Motorcycles	☐☐	20
d. Jet airplanes	☐☐	20
e. Helicopters	☐☐	20
f. Small propeller airplanes	☐☐	20
g. Neighbors' tools or yard equipment	☐☐	20

Includes 7 days per week, 24 hours per day.

This questionnaire asks about 3 different time periods. Read slowly and be sure you are understood. The respondents don't know these questions like they knew the "repeated call" ones.

h. Are there any other noises which bothered or annoyed you around here during this period? (DESCRIBE ALL. IF MORE THAN ONE CIRCLE MOST ANNOYING AND RATE IN "i") _____ 20 (NONE)

(30-31)

i. IF YES How much did it bother or annoy you? ☐☐

(32-33)

34 35 36 37 [ ][ ][ ][ ]

Q.8-12 These questions all concern the period from our first telephone contact to the present.

38-50 SKP

FOURTH CARD VIII

Q10 How typica has the noise been during the weeks we have been calling you; would you say the ...(cars)... were more noisy than usual, about like usual or less noisy than usual?

	MORE NOISY	ABOUT LIKE USUAL	LESS NOISY	NEVER HEAR NOISE (VOLUNTEER)
a. Cars	1	2	3	0
b. Trucks	1	2	3	0
c. Motorcycles	1	2	3	0
d. Jet airplanes	1	2	3	0
e. Helicopters	1	2	3	0
f. Small propeller planes	1	2	3	0
g. Neighbors' tools or yard equipment	1	2	3	0

Repeat above categories for trucks.

If you are sure the respondent remembers and understands the categories it is not necessary to repeat them anymore.

(57)

Q11 Has our calling and asking about noise made you notice the noise around here more or not?

1. NOTICE MORE
2. NOT NOTICE MORE
3. OTHER (RECORD VERBATIM) _____

This question just includes "notice". "Bothered" is covered in the next question (Q.12).

(58)

Q12 Has our asking about noise changed how you feel about the noises which have always been here; that is, when you hear those same noises now are you more bothered now, less bothered now, or about as bothered as you used to be?

1. MORE NOW
2. LESS NOW
3. ABOUT AS USED TO BE
4. OTHER (RECORD VERBATIM) _____

(59)

FOURTH CARD VIII

(COMPLETE Q13a AND b FOR EACH AIRCRAFT TYPE BEFORE ASK ABOUT NEXT TYPE)

Complete all of Q.13 before going on to Q.14.

(GO TO Q13a IF HEARD ON Q6)

Q13 Have you ever heard any [...jet airplanes..... / ... helicopters ..... / small propeller aircraft] here?

IF YES OR HEARD ON Q6

a. When you hear a [...jet airplane..... / ... helicopter ..... / small propeller aircraft] fly overhead, are you ever afraid it might crash nearby?

YES

b. When you hear it do you only occasionally fear it might crash, sometimes fear it might crash, or usually fear it might crash?

NO (GO TO NEXT TYPE)

	JET AIRPLANES	HELICOPTERS	SMALL PROPELLER AIRPLANES
EVER HEARD TYPE?	YES / 1.NO (SKP)	YES / 1.NO (SKP)	YES / 1.NO (SKP)
a. EVER AFRAID IT MIGHT CRASH	YES / 2.NO	YES / 2.NO	YES / 2.NO
IF YES	3.ONLY OCCASIONALLY 4 SOMETIMES 5.USUALLY	3.ONLY OCCASIONALLY 4.SOMETIMES 5.USUALLY	3.ONLY OCCASIONALLY 4.SOMETIMES 5.USUALLY

(60-62)

COMPLETE ALL AIRCRAFT TYPES ON Q13 BEFORE GOING TO Q14

*Ask all parts of Q.14 (a, b,c,d) about a single aircraft type before going on to the next type.

(ASK ABOUT HEARD TYPES)

Q14 Do you know whether the [...jet airplanes..... / ... helicopters ..... / small propeller aircraft] are mainly civilian or mainly military?

a. Are the [...jet airplanes..... / ... helicopters ..... / small propeller aircraft] just flying by or are they from Patrick Henry, Fort Eustis or somewhere else?

b. How important do you feel that those [...jet airplane..... / ... helicopter ..... / small propeller aircraft] flights are? Are they very important, somewhat important, a little important, or not at all important?

c. Do you feel the pilots or other authorities could do anything to reduce the noise from those [...jet airplanes..... / ... helicopters ..... / small propeller aircraft]?

YES

d. Do you think that they could reduce the noise a lot, somewhat, or only a little?

NO (GO TO NEXT TYPE)

	JET AIRPLANES	HELICOPTERS	SMALL PROPELLER AIRPLANES
ARE MAINLY	1. CIVILIAN 2. MILITARY 3. NOT KNOW	1. CIVILIAN 2. MILITARY 3. NOT KNOW	1. CIVILIAN 2. MILITARY 3. NOT KNOW

(63-65)

a. WHERE FROM	1.FLYING BY 2.PAT. HENRY 3.FT. EUSTIS 4.OTHER 5.NOT KNOW	1.FLYING BY 2.PAT. HENRY 3.FT. EUSTIS 4.OTHER 5.NOW KNOW	1.FLYING BY 2.PAT. HENRY 3.FT. EUSTIS 4.OTHER 5.NOT KNOW

(66-68)

b. HOW IMPORTANT	1.VERY 2.SOMEWHAT 3.A LITTLE 4.NOT AT ALL	1.VERY 2.SOMEWHAT 3.A LITTLE 4.NOT AT ALL	1.VERY 2.SOMEWHAT 3.A LITTLE 4.NOT AT ALL

(69-71)

c. COULD DO ANYTHING TO REDUCE NOISE	YES / 1.NO	YES / 1.NO	YES / 1.NO
IF YES	2.A LOT 3.SOMEWHAT 4.ONLY A LITTLE	2.A LOT 3.SOMEWHAT 4.ONLY A LITTLE	2.A LOT 3.SOMEWHAT 4.ONLY A LITTLE

(72-74)

FOURTH CARD VIII

Now we have a few background questions for you.

Q15 What year were you born? (75-76)

19 ☐☐

Q16 What is the highest grade of school you have completed?

1. GRADE SCHOOL (1-8)
2. SOME HIGH SCHOOL (9-11)
3. HIGH SCHOOL GRADUATE (12)
4. SOME COLLEGE
5. COLLEGE GRADUATE
6. MORE THAN 4 YEARS OF COLLEGE

If there is some other type of specialized education which the respondent volunteers, record it and explain. (77)

Q17 During the time you have lived in this house has the noise around here increased, decreased, or stayed about the same?

1. INCREASED
2. DECREASED
3. STAYED SAME
4. OTHER PATTERN (DESCRIBE) _____

_____ (78)

Note out if the respondent has moved from original address during the 8 week calling period. (A few have). Q.17 refers only to the time they lived at the original address where they were interviewed. 79-80 DUP

FIFTH CARD IX 1-5 DUP 6 7 [0|9] (8)

Q18 Do you know of anyone else around here who has been taking part in this study?

YES	2. NO
a. Do you know whether they have been called often like you or were only called once? 3. OFTEN 4. ONCE 5. DON'T KNOW	

Q19 Have any of your neighbors ever talked about this study with you?

YES-TALKED	2. NO-NOT TALKED
a. How many times have you talked with neighbors about the study; once or twice, 3 to 5 times, 6 to 10 times, or more than 10 times? 3. ONCE OR TWICE 4. THREE TO FIVE 5. SIX TO TEN 6. MORE THAN 10 7. OTHER (DESCRIBE)	This can be any neighbor - not just those that are respondents.

Don't offer your opinions. Explain you are an interviewer and only responsible for collecting the data.

Q20 Some people say this study is not really about noise generally, but only about some one type of noise. Have any of your neighbors or family said they thought that the study was really only about one type of noise?

YES-ONE TYPE	10. NO-NOT SAID (DON'T KNOW)
a. What type of noise did they think it was about? 01.CARS 04.JETS 07.NEIGHBORS' TOOLS 02.TRUCKS 05.HELICOPTERS OR YARD EQUIPMENT 03.MOTORCYCLES 06.SMALL PLANES 08.OTHER (DESCRIBE)	

(10-11)

Q21 Do you personally think that the study sponsors are mainly interested in only one type of noise or in all types of noise?

ONE TYPE	10. ALL TYPES 11. DON'T KNOW (ACCEPT IF VOLUNTEERED)
a. Which one type do you think they are interested in? 01.CARS 04.JETS 07.NEIGHBORS' TOOLS 02.TRUCKS 05.HELICOPTERS OR YARD EQUIPMENT 03.MOTORCYCLES 06.SMALL PLANES 08.OTHER (DESCRIBE)	

(12-13)

Don't solicit additional answers, just what the respondent volunteers.

FOURTH CARD IX

Q22 We want to know how you feel about receiving $40 for taking part in the study. Considering the length of the interviews and the number of times we called you, would you say that $40 is more than is needed, about right or too little?

1. MORE THAN NEEDED
2. ABOUT RIGHT
3. TOO LITTLE

Please include all comments about the study here (not just monetary comments). For example if they enjoyed it, found it too bothersome, interesting, etc... Write as much as possible (but not in right hand column)

Q23 How did you first hear that people were being paid $40 in this study: from the interviewer, from a neighbor or from someone else?

INTERVIEWER

a. Do you happen to remember whether the interviewer mentioned the $40 at the start of the interview or at the end of the interview?

05. AT START
06. AT END
07. OTHER (DESCRIBE) _____
_____
08. DO NOT REMEMBER

02. NEIGHBOR
03. OTHER (DESCRIBE) _____
_____
04. DO NOT REMEMBER

Q.20, 22 & 24 - If respondents ask you for further details of the study, explain that if they would like to learn more, a report can be sent to them and make a note next to Q.27. Also check the yellow sheets and call back sheets for previous "results wanted" notations. Note these next to Q.27.

Q24 Those are all the questions I have for you and this is the last time I call you. Do you have any questions you would like to ask me?

2. YES [WRITE QUESTION VERBATIM] _____
_____
_____

1. NO

(17)
18-19 ☐☐
20-21 ☐☐
22-39 SKP

********** FILL OUT AT END **********

Q25 TIME END ☐☐:☐☐ (40-43)

Q26 ACCURACY OF EPISODE TIME REPORTING [ACCURACY OF POOREST REPORT]

1. Within 5 minutes
2. Within 15 minutes
3. Within 30 minutes
4. Poorer than 30 minutes

(44)

Q27 IF MORE THAN 10 EPISODES RECORD NUMBER ☐☐ (45-46)

IF NO INTERVIEW: DISPOSITION CODE [FROM FOLLOW UP RECORD] ☐ (47)

WAS R HOME 8 AM TO 5 PM? 1. YES 2. NO 3. DK (48)

49-78 SKP
79-80 DUP

APPENDIX E:

RELATIONSHIP BETWEEN NOISE METRICS

The recordings made at the reference site were analyzed to provide maximum A-weighted sound pressure level, LA; Sound Exposure Level, SEL; Perceived Noise level, PNL; and Effective Perceived Noise Level, EPNL. The relationship between residents' reactions and two of these metrics, LA and SEL, is directly analyzed in the body of this report. From the analyses described in this appendix it is clear that no advantages would have been realized from a direct analysis of the relationship between reactions and measured values of EPNL or PNL.

The relationship between the two physical noise indices of SEL and EPNL was examined for the planned flights which were recorded at the reference site. A multiple regression analysis found that EPNL is a simple linear function of SEL and helicopter type: for non-impulsive helicopters EPNL=SEL + 5.6, for impulsive helicopters EPNL =SEL + 6.9. When alternative, more complex non-linear and interactive models were examined it was found that they are not significantly different (p=.05) from the simple linear model. The variation in EPNL which is not explained by SEL (standard deviation of the residuals of 0.9 dB) is so small that any differences in the relationships with residents' reactions could not have been detected in this study.

The relationship between LA and PNL was also examined. Once again it was found that the variation in the more complex measure, PNL, which could not be explained by the simpler measure, LA, (standard deviation of the residuals of 1.2 dB) is so small that effects on reactions could not have been detected. In this case, however, PNL was not a simple linear function of LA. There appear to be small but statistically significant non-linear trends and the relationship appears to be steeper for non-impulsive helicopters. The noise data set is not complete enough at low noise levels for a more extended analysis of the relationship between these two helicopter types. Values of EPNL can not be calculated for the lower level, unplanned flights because the noise events were too near the ambient levels to obtain the accuracy that is required for calculations of the tone corrections for EPNL.

APPENDIX F:

DISTRIBUTION OF RESPONSES TO SELECTED QUESTIONS FROM THE THREE QUESTIONNAIRES

****** INITIAL FACE-TO-FACE QUESTIONNAIRE ******

We want to find out about the environment around here and how you feel about it over the next few weeks.

Q1 How do you feel about this area, the block or so right around here? What are the things you like most about this area, that is, the things you feel are advantages and make it a good place to live?

START TIME ☐☐☐☐

Reference to sounds	
59	"quiet"
41	no reference to sound
100%	
(336)	

Advantages mentioned	
6	Ft. Eustis
3	Convenience for work
0*	No advantages
91	OTHER
100%	
(338)	

Q2 Are there any things you particularly dislike about this area, that is things which are disadvantages?
(RECORD ANSWERS. RECORD ALL PHRASES DESCRIBING ENVIRONMENTAL NUISANCES VERBATIM)

Number of mentions (not percentage) - One person could give as many as 3 mentions

Explicit mention of noise from:

7 Cars
3 Trucks
1 Motorcycles
6 Traffic (generally)
1 Helicopters
1 Aircraft generally
1 Neighbors tools
3 Audio equiptment
1 Neighbors parties
3 People outside (generally)
1 Boats
2 Construction
10 Dogs
3 Other

Neighborhood nuisances (No explicit noise mention)

25 Cars
6 Trucks
3 Motorcycles
44 Traffic
3 Helicopters
1 Aircraft generally
9 People in area
5 Construction
21 Dogs

Other

72 Neighborhood amenities or services lacking
3 Some aspect of Ft. Eustis
11 Location or availability of transportation
133 Miscellaneous

No Dislikes

76 Nothing dislike

Q3 Taking everything into consideration, how would you rate this neighborhood as a place to live? Would you say it is excellent, good, fair, or poor?

42	EXCELLENT
52	GOOD
6	FAIR
0*	POOR
100%	
(338)	

* *0 indicates that less than 0.5% of the respondents gave this answer*

In a moment I will ask you to rate some of the sounds around here using this scale (SHOW CARD A). Any sound can be rated somewhere between 0, if you are "not at all annoyed," to 10 if you are "extremely annoyed", that is the more annoyed, the bigger the number. If you have never heard some sound around here tell me, but if you ever hear it, rate it somewhere from zero to ten on this scale. When you rate a sound take into account both how often you hear and how much it bothers you when you do hear it.

Q4 Thinking about this last year, how do you feel about the sounds from ...(cars)... around here? How much do they bother or annoy you?

	RATING MEAN**	DO NOT HEAR %	
a. Cars	3.2	2	(338)
b. Trucks	2.4	9	"
c. Motorcycles	3.0	9	"
d. Jet airplanes	2.4	6	"
e. Helicopters	2.5	6	"
f. Small propeller airplanes	0.9	23	"
g. Neighbors' tools or yard equipment	1.5	3	"
h. Are there any other noises which bother or annoy you around here? (DESCRIBE ALL. IF MORE THAN ONE CIRCLE MOST ANNOYING AND RATE IN "i") _____ _____		55	
i. IF YES How much does it bother or annoy you?	2.8		

(The only "other" sources mentioned by more than 3% of the sample in Q4 are dogs (25%) and neighbors' audio equiptment (5%).

***Not hear is scored zero*

Q5 Please look at this card (SHOW CARD B) and tell me how annoying the noise from cars is around here. Would you say the noise from cars was not at all annoying, slightly annoying, moderately annoying, very annoying, or extremely annoying?

33	NOT AT ALL
39	SLIGHTLY
19	MODERATELY
7	VERY
2	EXTREMELY
100%	
(338)	

Q11 Let's look at that zero to 10 annoyance scale again: What is the lowest number you would use and still say you were "highly annoyed"?

SCALE NUMBER *MEAN = 6.32 (332)*

Q12 What year did you move into this house?

19 ☐☐ *12% in 1983 (less than 9 months)*
50% more than 7 years

Q13 Do you own this house or are you renting it?

88	OWN (OR BUYING)
12	RENT
100%	
(338)	

Q14 How many of the people in your household go out to work? (LIST RELATIONSHIP TO RESPONDENT BEFORE ASKING a)

14% of respondents work *MEAN = 1.3 (338)*
72% of respondents have a working spouse

a. Where do each of them work?

RELATION TO RESPONDENT *	PLACES OF WORK (DO NOT READ)
1. RESPONDENT 2. SPOUSE 3. CHILD 4. PARENTS 5. OTHER _____	1.SHIPYARD 2.FT. EUSTIS 3.PATRICK HENRY 4.LANGLEY AFB 5.NASA 6.OTHER (DESCRIBE) _____

SUMMARY (Place of work of working household members)

9	*Shipyard*
13	*Ft. Eustis*
0	*Patrick Henry*
3	*Langley Air Force Base*
4	*NASA*
61	*Other*
10	*Other military*
100%	
(432)	

RECORD THE FOLLOWING OBSERVATIONS AFTER INTERVIEW IS COMPLETED

Q21 SEX OF RESPONDENT

20	Male
80	Female
100%	*(338)*

Q22 ESTIMATED AGE OF RESPONDENT

20	18-29
27	30-39
19	40-49
19	50-59
13	60-69
2	70 or more
100%	
(329)	

****** REPEATED TELEPHONE QUESTIONNAIRE ******

IS THIS INTERVIEW
86 Same day
14 Yesterday
* Non-int
100%
(6047)

Q2 Did you sleep or try to take a nap during the day?

78 YES
22 NO
100%
(6047)

Q3 Did you have any of the windows open in your house today?

45 CLOSED

a. In the rooms you were in were the windows open or closed most of the time?

45 MOSTLY OPEN
10 MOSTLY CLOSED
100%
(6047)

We are going to rate (today's) neighborhood sounds on your scale* which goes from 0, if you were "not at all annoyed" to 10 if you were "extremely annoyed." Remember to take into account both how many times you heard a sound as well as how much it bothered you when you did hear it. If you do not remember hearing a sound (today) don't rate it and I will mark it as "not heard."

Q4 When you were at home during the day (today) how much were you bothered or annoyed by the noise from . . . . . (cars) . . . ?

	RATING	NOT HEARD	
a. Cars	1.0	12%	(6047)
b. Trucks	1.2	41	"
c. Motorcycles	0.4	74	"
d. Jet airplanes	1.7	42	"
e. Helicopters	2.1	42	"
f. Small propeller airplanes	0.6	70	"
g. Neighbors' tools or yard equipment	0.7	69	"
h. Is there any other noise which bothered or annoyed you around here today? (DESCRIBE All. CIRCLE WORST)	0.9	82	"

1. IF YES How much did it bother you?

**********FILL OUT AFTER INTERVIEW**********

ACCURACY OF EPISODE TIME REPORTING [ACCURACY OF POOREST REPORT]
81 Within 5 minutes
17 Within 15 minutes
2 Within 30 minutes
0 Poorer than 30 minutes
100% (6011)

* *The tabulations in this questionnaire do not include the 917 respondent days when a respondent was not contacted and the 134 respondent-days when the interviewed respondents were not at home during any of the 9 hour day.*

Q5 These questions are about this past year, not just today. Taking everything into consideration, how would you rate this neighborhood as a place to live? Would you say it is excellent, good, fair, or poor?

11	EXCELLENT
48	GOOD
8	FAIR
0	POOR
100%	
(330)	

Now think about the noises during this whole past year. We need to use the same zero to ten scale to rate how bothered or annoyed you were by each sound this last year and not just today. Take into account both how often you hear the sound and how much it bothers you when you do hear it. If you have never heard some sound around here tell me, but if you ever hear it, rate it somewhere from zero to ten.

Q6 Thinking about this last year, how do you feel about the sounds from ...(cars)... around here? How much have they bothered or annoyed you?

	RATING *(Mean)**	DO NOT HEAR *(%)*	
a. Cars	*2.5*	*1*	*(330)*
b. Trucks	*2.7*	*1*	*(330)*
c. Motorcycles	*2.1*	*9*	*(330)*
d. Jet airplanes	*3.6*	*1*	*(330)*
e. Helicopters	*4.2*	*2*	*(330)*
f. Small propeller airplanes	*1.7*	*9*	*(330)*
g. Neighbors' tools or yard equipment	*2.2*	*2*	*(330)*
h. Are there any other noises which bother or annoy you around here? (DESCRIBE ALL. IF MORE THAN ONE CIRCLE MOST ANNOYING AND RATE IN "i") _____ _____ _____		*49*	*(330)*
i. IF YES How much does it bother or annoy you?	*2.8*		

**(Do not hear = 0)*

Q7 Now another question about how annoying the noise from cars was around here this last year. Would you say the noise from cars was not at all annoying, slightly annoying, moderately annoying, very annoying, or extremely annoying?

34	NOT AT ALL
41	SLIGHTLY
21	MODERATELY
3	VERY
1	EXTREMELY
100%	
(330)	

Q8 Let's look at that zero to ten annoyance scale again: What is the lowest number you would use and still say you were "highly annoyed"?

SCALE NUMBER	% *(Mean = 5.57)*
0	*0*
1	*5*
2	*5*
3	*7*
4	*9*
5	*24*
6	*14*
7	*14*
8	*13*
9	*3*
10	*5*
	100%
	(329)

The next questions ask about the time since the middle of September when we have been calling you.

Q8 In terms of the amount of time you spend at home, how typical have these weeks been when we called you? Would you say you have spent more time than usual at home, less time than usual, or about the usual amount of time at home?

16 MORE AT HOME
13 LESS AT HOME
71 USUAL
100%

Now think about the noises during this 8-week period when we have been calling you. We need to use the same zero to ten scale to rate how bothered or annoyed you were by each sound during this period.

Q9 Thinking about this 8-week period while we have been calling you, how did you feel about the sounds from ...(cars)... around here? How much did they bother or annoy you?

	RATING *(Mean)**	DO NOT HEAR *(%)*	
a. Cars	*1.8*	*.1*	*(330)*
b. Trucks	*2.4*	*3*	*(330)*
c. Motorcycles	*1.4*	*11*	*(330)*
d. Jet airplanes	*3.2*	*2*	*(330)*
e. Helicopters	*3.9*	*2*	*(330)*
f. Small propeller airplanes	*1.5*	*9*	*(330)*
g. Neighbors' tools or yard equipment	*1.7*	*8*	*(330)*
h. Are there any other noises which bothered or annoyed you around here during this period? (DESCRIBE ALL. IF MORE THAN ONE CIRCLE MOST ANNOYING AND RATE IN "i") _____		*55*	*(330)*
i. IF YES How much did it bother or annoy you?	[2][3]		

**(Do not hear = 0)*

Q10 How typical has the noise been during the weeks we have been calling you; would you say the ...(cars)... were more noisy than usual, about like usual or less noisy than usual?

	MORE NOISY	ABOUT LIKE USUAL	LESS NOISY	NEVER HEAR NOISE (VOLUNTEER)	
a. Cars	3	88	8	1 = 100%	(330)
b. Trucks	17	74	8	1 = 100%	(330)
c. Motorcycles	4	70	14	12 = 100%	(330)
d. Jet airplanes	21	73	5	1 = 100%	(330)
e. Helicopters	36	57	5	2 = 100%	(330)
f. Small propeller planes	7	75	8	10 = 100%	(330)
g. Neighbors' tools or yard equipment	8	74	16	2 = 100%	(330)

Q11 Has our calling and asking about noise made you notice the noise around here more or not?

75 NOTICE MORE
24 NOT NOTICE MORE
1 OTHER (RECORD VERBATIM) _____
100%

Q12 Has our asking about noise changed how you feel about the noises which have always been here; that is, when you hear those same noises now are you more bothered now, less bothered now, or about as bothered as you used to be?

12 MORE NOW
2 LESS NOW
86 ABOUT AS USED TO BE
OTHER (RECORD VERBATIM) _____
100%

(COMPLETE Q13a AND b FOR EACH AIRCRAFT TYPE BEFORE ASK ABOUT NEXT TYPE)

(GO TO Q13a IF HEARD ON Q6)
Q13 Have you ever heard any [...jet airplanes..... / ... helicopters ..... / small propeller aircraft] here?

IF YES OR HEARD ON Q6

a. When you hear a [...jet airplane..... / ... helicopter ..... / small propeller aircraft] fly overhead, are you ever afraid it might crash nearby?

YES

b. When you hear it do you only occasionally fear it might crash, sometimes fear it might crash, or usually fear it might crash?

NO (GO TO NEXT TYPE)

JET AIRPLANES	HELICOPTERS	SMALL PROPELLER AIRPLANES
EVER HEARD TYPE?		
NO (N=4)	NO (N=5)	NO (N=26)
a. EVER AFRAID IT MIGHT CRASH		
56 NO	67 NO	80 NO
23 ONLY OCCASIONAL	15 ONLY OCCASIONAL	12 ONLY OCCASIONAL
1 SOME-TIMES	13 SOME-TIMES	6 SOME-TIMES
6 USUALLY	5 USUALLY	2 USUALLY
100% (326)	100% (325)	100% (304)

COMPLETE ALL AIRCRAFT TYPES ON Q13 BEFORE GOING TO Q14

(ASK ABOUT HEARD TYPES)
Q14 Do you know whether the [...jet airplanes..... / ... helicopters ..... / small propeller aircraft] around here are mainly civilian or mainly military?

a. Are the [...jet airplanes..... / ... helicopters ..... / small propeller aircraft] just flying by or are they from Patrick Henry, Fort Eustis or somewhere else?

b. How important do you feel that those [...jet airplane..... / ... helicopter ..... / small propeller aircraft] flights are? Are they very important, somewhat important, a little important, or not at all important?

c. Do you feel the pilots or other authorities could do anything to reduce the noise from those [...jet airplanes..... / ... helicopters ..... / small propeller aircraft]?

YES

d. Do you think that they could reduce the noise a lot, somewhat, or only a little?

NO (GO TO NEXT TYPE)

ARE MAINLY		
42 CIVILIAN	0 CIVILIAN	74 CIVILIAN
29 MILITARY	97 MILITARY	6 MILITARY
22 NOT KNOW	3 NOT KNOW	19 NOT KNOW
7 HALF/HALF		2 HALF/HALF
100% (329)	100% (327)	100% (307)
a. WHERE FROM		
3 FLYING BY	0 FLYING BY	10 FLYING BY
54 PAT.HENRY	1 PAT.HENRY	61 PAT.HENRY
12 FT.EUSTIS	91 FT.EUSTIS	9 FT.EUSTIS
17 OTHER	2 OTHER	1 OTHER
14 NOT KNOW	6 NOT KNOW	19 NOT KNOW
100% (329)	100% (327)	100% (307)
b. HOW IMPORTANT		
65 VERY	64 VERY	16 VERY
27 SOMEWHAT	29 SOMEWHAT	35 SOMEWHAT
4 A LITTLE	4 A LITTLE	31 A LITTLE
3 NOT AT All	3 NOT AT ALL	18 NOT AT ALL
1 NOT KNOW	0 NOT KNOW	0 NOT KNOW
100% (327)	100% (325)	100% (305)
c. COULD DO ANYTHING TO REDUCE NOISE		
84 NO	62 NO IF YES	75 NO
6 A LOT	13 A LOT	3 A LOT
17 SOMEWHAT	14 SOMEWHAT	10 SOMEWHAT
10 ONLY A LITTLE	10 ONLY A LITTLE	10 ONLY A LITTLE
3 NOT KNOW	1 NOT KNOW	1 NOT KNOW
100% (329)	100% (327)	100% (307)

Q15 What year were you born?

19 ☐☐

Average age is 38 years.

Q16 What is the highest grade of school you have completed?

2	GRADE SCHOOL (1-8)
10	SOME HIGH SCHOOL (9-11)
35	HIGH SCHOOL GRADUATE (12)
33	SOME COLLEGE
13	COLLEGE GRADUATE
7	MORE THAN 4 YEARS OF COLLEGE
100%	
(330)	

Q17 During the time you have lived in this house has the noise around here increased, decreased, or stayed about the same?

43	INCREASED
8	DECREASED
48	STAYED SAME
1	OTHER PATTERN (DESCRIBE) _____
100%	
(330)	

Q18 Do you know of anyone else around here who has been taking part in this study?

52 NO

Do you know whether they have been called often like you or were only called once?

25	OFTEN
0	ONCE
22	DON'T KNOW
100%	
(329)	

Q19 Have any of your neighbors ever talked about this study with you?

73 NO-NOT TALKED

How many times have you talked with neighbors about the study; once or twice, 3 to 5 times, 6 to 10 times, or more than 10 times?

19 ONCE OR TWICE
4 THREE TO FIVE
2 SIX TO TEN
2 MORE THAN 10
OTHER (DESCRIBE) _____

100%
(330)

Q20 Some people say this study is not really about noise generally, but only about some one type of noise. Have any of your neighbors or family said they thought that the study was really only about one type of noise?

94 NO-NOT SAID
(DON'T KNOW)

YES-ONE TYPE

What type of noise did they think it was about?

- CARS	*2* JETS	*0* NEIGHBORS' TOOLS OR YARD EQUIPMENT	= *100%* *(330)*
0 TRUCKS	*0* HELICOPTERS		
0 MOTORCYCLES	*0* SMALL PLANES	*1* OTHER (DESCRIBE)	
		3 AIRCRAFT GENERALLY	

Q21 Do you personally think that the study sponsors are mainly interested in only one type of noise or in all types of noise?

73 ALL TYPES
7 DON'T KNOW (ACCEPT IF VOLUNTEERED)

ONE TYPE

Which one type do you think they are interested in?

- CARS	*3* JETS	*0* NEIGHBORS' TOOLS OR YARD EQUIPMENT	= *100%* *(330)*
0 TRUCKS	*1* HELICOPTERS		
0 MOTORCYCLES	- SMALL PLANES	*5* OTHER (DESCRIBE)	
		11 AIRCRAFT GENERALLY	

Q22 We want to know how you feel about receiving $40 for taking part in the study. Considering the length of the interviews and the number of times we called you, would you say that $40 is more than is needed, about right or too little?

20 MORE THAN NEEDED
72 ABOUT RIGHT
8 TOO LITTLE
100% (328)

Q23 How did you first hear that people were being paid $40 in this study: from the interviewer, from a neighbor or from someone else?

5 NEIGHBOR
1 OTHER (DESCRIBE) _____
- DO NOT REMEMBER

INTERVIEWER

Do you happen to remember whether the interviewer mentioned the $40 at the start of the interview or at the end of the interview?

11 AT START
70 AT END
2 OTHER (DESCRIBE) _____
6 (IN MIDDLE) _____
100%
(330) DO NOT REMEMBER

APPENDIX G:

EFFECT OF NON-STANDARD FLIGHTS ON SURVEY RESULTS

Perfect control over noise exposure would have required that the only audible helicopter noise come from flights which were exactly on the flight path traveling at the prescribed speed and altitude. Departures from this ideal plan occurred because additional uncontrolled helicopter flights intruded into the area and because some of the planned flights departed from the planned procedure. Variations in the planned flights will be briefly discussed before turning to the effects of unplanned flights.

All of the analyses in this appendix are based on the measurements of the maximum A-weighted levels (LA). This is the only measurement which is directly available from both the fixed and the mobile noise measurement sites.

Though the controlled flight plan specified that all flights on any one day would be identical, the observers noted some cases where planned flights were not exactly on the flight path, where the flight path was joined late or left early and where a helicopter coming to the end of the study area performed a turning manuever which was audible. As a result there was some variation in the noise levels of the different flights measured at any one site on the same day. The noise levels (LA) from planned flights measured at single measurement sites on a day had a standard deviation of about 2.9 dB. There were also differences between the noise levels measured from a particular flight at different positions. The standard deviation of the noise levels for the same flights measured at the three different sites is σ=2.6 dB. Significance tests show that there are some systematic differences between sites in the noise levels measured from the same planned flights. Visual inspection of the pattern of these differences on a map of the study area could not detect a meaningful pattern. Deviations of sites from the mean do not appear to be simply related to either side-line distance or distance from the fixed site at the extreme south end of the area (tables G.1 and G.2). The difference between the average maximum noise levels (logarithmic average of all planned flights at a site on one day) at the three sites on any one day was small (standard deviation 1.9 dB).

Table G.1: AVERAGE DEVIATIONS FROM MEAN OBSERVED NOISE LEVEL FOR EACH PLANNED EVENT RELATED TO DISTANCE FROM CENTERLINE OF STANDARD FLIGHT PATH

WEST OF PATH		ON PATH	FIXED SITE	EAST OF PATH	
<-150	-149 to -50	-49 to 49	0	50 to 149	150+
0.6 dB	1.1 dB	0 dB	-0.4 dB	1.7 dB	0.9 dB

Table G.2: AVERAGE OF DEVIATIONS FROM MEAN OBSERVED NOISE LEVEL FOR EACH PLANNED EVENT RELATED TO DISTANCE FROM START OF FLIGHT PATH

Distance from start of flight path (meters)				
0 (Fixed site)	400-1000	1000-1999	2000-2999	3000-4012
-1.4 dB	1.1 dB	-1.5 dB	1.2 dB	1.3 dB

On the first test days the noise measurement team reported that many low-level helicopter operations were audible, including some hovering maneuvers at Fort Eustis, but that many of these could not be distinguished from other ambient noise in the noise measurements. The noise measurement team was thus instructed to measure all helicopter noise events for which LA reached 60 dB. Of the 713 helicopter noise events which were noted by the noise measurement teams, 641 were at 60 dB or greater. Of these 641, it was determined that 420 of the observations were of 140 flights which were reported by all three noise measurement teams. The planned noise events thus represented 66% (420/641) of the helicopter noise events at or above 60 dB during the testing period. The unplanned events were generally at a lower noise level (arithmetic mean of 68 dB) than the planned noise events (arithmetic mean of 77 dB).

A good estimate of the total noise exposure actually experienced in the field must include both the planned and unplanned flights. The logarithmic average of all flights for which LA was 60 dB or greater was calculated for each noise measurement site. The standard deviation of these average maximum noise levels on the same day is 2.4 dB (logarithmically averaged maximum noise levels at each site). The comparable standard deviation for $\log_{10}$ number of events is 0.13. Inspection of the site differences within each day again did not suggest a spatial pattern which would explain the site differences. Table G.3 shows that the differences do not form a simple pattern with respect to distance from the beginning of the flight path.

Table G.3: AVERAGE OF THE DIFFERENC IN THE NUMBERS OF HELICOPTERS OBSERVED AT THE FIXED SITE AND THE MOBILE SITES BY DISTANCE FROM START OF FLIGHT PATH

Distance from start of flight path (meters)				
0 (Fixed site)	400-1000	1000-1999	2000-2999	3000-4012
0	-4.3	2.3	-3.1	-3.1

Given the evidence for differences in noise exposures at different locations within the study area on the same day, the possibility of estimating separate noise levels for each sub-area within the study area was considered. The noise measurement team recorded the position of each unplanned flight on a map with as much accuracy as possible given their ground-based position in a built-up area. After the analyses of the noise data were completed, however, the conclusion was reached that no advantages would be gained from calculating sub-area estimates for the noise levels from the unplanned flights. This was partly because the data for unplanned flights were not sufficiently accurate to estimate noise levels over the entire study area. (Noise data came from only three observation points spread over the 4000 meter long area and since most flights were seen from only at only one point, the estimates of ground tracks or altitude could be regarded as little more than rough guesses). The other reason for not making differentiated estimates is that the analyses, presented in the next paragraph, using an alternative simpler strategy suggest that the errors introduced by unplanned flights can be satisfactorily controlled.

The alternative strategy was to first calculate the logarithmic average peak noise level and log $_{10}$ number of events at each site. The arithmetic mean of the three estimates for each day (one logarithmetic mean from each noise measurement site) then gives a best unbiased estimate of the everage noise level in the study area for each study day. The within day variance of the site noise characteristics then provides a basis for estimating the errors in specifying the mean daily noise characteristics. The reliability of the noise data can then be calculated. The total variance is the variance of the 17 different average daily noise characteristics σ_x^2, where X is the noise characteristic, either level or log $_{10}$ number. The error variance for the noise levels (σ_{xe}^2) is the within day variance in the value of the site characteristic divided by three (a sample of size 3 is used to determine the value of the characteristic on each day). The general formula for this reliability coefficient (r_{xx}) is:

$$r_{xx} = \frac{\sigma_x^2 - \sigma_{xe}^2}{\sigma_x^2}$$

For the present data set this gives an estimate of the reliability of the average peak noise level of r=0.83 and for $\log_{10}$ number of events of r_{xx}=0.94. The comparable reliability for the nine hour helicopter LEQ is r_{xx}=0.93.

Observed regression coefficients can be corrected with these reliabilities using the following formula which relates the observed regression coefficient (B) to the corrected estimate (B):

$$B = B \cdot \frac{1}{r_{xx}}$$

The use of a single average noise level or number of events for the whole area would thus not appear to bias the estimates of the regression coefficients by more than 14%. Where regression coefficients have been

corrected for the errors in physical measurements this is noted in the text.

As an additional check on the possible effect of having used a mean noise level for the entire area rather than individual sub-area noise levels, the responses on the four days when the measurement sites all experienced the most similiar noise exposure were compared with the responses on five days when the measurement sites had the most divergent noise exposures. Statistical theory would suggest that with the large amount of individual variation the difference in the amount of agreement about noise annoyance on the two types of days should be difficult to detect. The data were found to be consistent with the theory since no difference could be found between the amount of between-respondent variability on the 4 days with the most homogeneous noise exposures and the 5 days when noise exposures differed the most within the area.

These deviations from the original study design must also be considered in the analysis of the effect of helicopter type (impulsive or non-impulsive). The effect of helicopter type was to be studied by comparing reactions to days with totally different types of helicopters. Though the noise measurement teams confirmed that all of the planned flights were of the same type (impulsive or non-impulsive) on any one day, the extra unplanned flights could of course be of another type of helicopter. The noise measurement teams noted the types of helicopters for 51% (113) of the unplanned flights with LA of 60 dB or greater. On the days which had planned impulsive helicopter flights, 74% of the unplanned but identified helicopters were impulsive helicopters. On the planned non-impulsive days 40% of the unplanned but identified flights were non-impulsive. (The unplanned, identified impulsive flights consisted of 70 UH-1H, two CH-47, and three CH-46 helicopters. The unplanned, identified non-impulsive flights consisted of 15 UH-60, one OH-58, nine SH-3, one SH-60, one Jet Ranger, and six CH-53 helicopters). Though the majority of flights on any one day are of the planned type there are enough unplanned flights that the helicopter type must be considered to be "mixed" on most days. The comparison of the values of LEQ for the two types of helicopter exposure days (appendix A) shows that the two types were never within 7 dB of each other and that there were five days on which the value of LEQ from the unplanned flights was within 10 dB of the LEQ for the planned helicopter type. Though the relatively impulsive and non-impulsive noise event days can still be compared, another strategy also was used: a 9 hour LEQ for each of the helicopter types was computed for each day and the relative effect of equal LEQ values from the different sources was compared.

APPENDIX H:

TABLES FOR NOISE LEVEL, NUMBER OF EVENT AND HELICOPTER TYPE EFFECTS BASED ON ALTERNATIVE OPERATIONAL DEFINITIONS OF ACOUSTICAL VARIABLES

TABLE H-1: ALL RESPONDENTS HOME AT ANY TIME DURING THE 8 A.M. TO 5 P.M. STUDY DAY (N=4880)[a]

Effect of noise level, number of events and helicopter type for four noise metrics and three data bases for noise level and number of events.

Noise metric	Regression equation[b]				Decibel equivalents (dB) of effects for:		Multiple correlation coefficients from the regression when number is:	
	Intercept	Unstandardized regression coefficients for:						
	B_C	Noise Level B_L	Number[c] ($\log_{10}N$) B_N	Helicopter type B_H	Number[c] $k_N=B_N/B_L$	Helicopter type $k_H=B_H/B_L$	Trans-formed[d] ($\log_{10}N$)	Not[e] trans-formed (N)
PART A: Not individualized, all flights > 60 L_A in noise data base (216 flights)								
SEL	-14.94	0.19	1.22		6.6		.234	.234
	-15.00	0.19	1.06	0.36	5.7	2.0	.241	.241
LA	-7.13	0.11	1.40		13.2		.213	.211
	-9.50	0.14	1.00	0.76	7.4	5.5	.239	.238
PART B: Individualized, flights > 60 L_A when respondent home in data base								
SEL	-13.65	0.17	1.63		9.6		.307	.300
	-13.58	0.17	1.58	0.19	9.4	1.1	.309	.301
LA	-7.35	0.11	1.77		16.2		.297	.286
	-8.64	0.12	1.59	0.51	12.8	4.1	.306	.297
PART C: Not individualized, all flights > 66 L_A in noise data base (153 flights)								
SEL	-15.78	0.19	1.20		6.2		.234	.239
	-15.56	0.19	1.10	0.34	5.8	1.8	.240	.243
LA	-6.71	0.10	1.32		12.8		.210	.215
	-9.37	0.13	1.02	0.75	7.6	5.6	.237	.240
PART D: Individualized, flights > 66 L_A when respondent home in data base[f]								
SEL	-10.85	0.14	1.48		10.5		.293	.292
	-10.85	0.14	1.43	0.25	10.3	1.8	.295	.293
LA	-5.46	0.09	1.63		18.5		.284	.260
	-6.91	0.10	1.46	0.53	14.0	5.1	.294	.290
PART E: Not individualized, only planned flights in noise data base (140 flights)								
SEL	-12.95	0.16	1.28		7.9		.232	.232
	-13.49	0.17	1.14	0.41	6.8	2.5	.241	.239
LA	-4.88	0.08	1.32		16.2		.211	.208
	-7.98	0.12	1.04	0.82	8.8	6.9	.239	.237
EPNL	-14.71	0.17	1.32		7.6		.243	.238
	-14.43	0.17	1.29	0.09	7.5	0.5	.243	.238
PNL	-8.92	0.11	1.39		12.2		.229	.222
	-10.12	0.12	1.21	0.53	9.7	4.3	.242	.235

a. Includes 702 responses about days when the respondent was not present for a planned flight. For those responses the individualized exposure is the level from unplanned flights and number of unplanned flights adjusted for the proportion of interview day during which the respondent is home.

b. All terms are described in Equation 1 in the text.

c. Number is represented by $\log_{10}N$.

d. Number is represented by $\log_{10}N$. The regression equation which accompanies the multiple correlation coefficient is of the form:

$$A=B_o + B_L \bullet L + B_N \bullet (\log_{10}N)$$

e. Number is not transformed. The regression equation is:

$$A=B_o + B_L \bullet L + B_N \bullet N$$

f. For the individualized flights $\geq$ 66 there are only 4,819 responses because there was one day on which there were no unplanned flights below 66 dB and 61 people were not home during the planned flights on that day.

TABLE H-2: RESPONDENTS HOME DURING AT LEAST ONE PLANNED FLIGHT (N=4178)[a]

Effect of noise level, number of events and helicopter type for four noise metrics and three data bases for noise level and number of events.

Noise metric	Regression equation[b]				Decibel equivalents (dB) of effects for:		Multiple correlation coefficients from the regression when number is:	
	Intercept	Unstandardized regression coefficients for:						
	B_0	Noise Level B_L	Number[c] ($\log_{10}N$) B_N	Helicopter type B_H	Number[c] $k_N=B_N/B_L$	Helicopter type $k_H=B_H/B_L$	Trans-[d] formed ($\log_{10}N$)	Not[e] trans-formed (N)
PART A: Not individualized, all flights > 60 L_A in noise data base (216 flights)								
SEL	-16.24	0.20	1.09		5.4		.232	.230
	-16.25	0.20	0.97	0.27	4.8	1.3	.235	.234
LA	-8.05	0.12	1.28		10.4		.210	.206
	-10.09	0.15	0.92	0.69	6.2	4.7	.230	.229
PART B: Individualized, flights > 60 L_A when respondent home in data base								
SEL	-16.51	0.20	1.64		8.1		.264	.262
	-16.46	0.20	1.57	0.24	7.8	1.2	.267	.264
LA	-8.36	0.12	1.77		14.5		.245	.242
	-10.27	0.14	1.53	0.65	10.6	4.5	.262	.259
PART C: Not individualized, all flights > 66 L_A in noise data base (153 flights)								
SEL	-17.32	0.22	1.10		5.1		.232	.235
	-17.16	0.21	1.03	0.24	4.8	1.1	.235	.237
LA	-7.85	0.12	1.22		10.1		.209	.211
	-10.14	0.15	0.94	0.69	6.4	4.7	.229	.231
PART D: Individualized, flights > 66 L_A when respondent home in data base								
SEL	-14.27	0.18	1.42		7.9		.256	.260
	-14.32	0.18	1.35	0.31	7.5	1.7	.260	.263
LA	-6.70	0.11	1.57		14.9		.238	.242
	-8.86	0.13	1.35	0.68	10.4	5.2	.257	.259
PART E: Not individualized, only planned flights in noise data base (140 flights)								
SEL	-14.28	0.18	1.22		6.8		.230	.230
	-14.64	0.18	1.11	0.32	6.0	1.8	.235	.234
LA	-5.80	0.10	1.26		13.0		.208	.205
	-8.54	0.13	0.99	0.76	7.7	5.9	.230	.229
EPNL	-15.68	0.19	1.26		6.7		.238	.233
	-15.75	0.19	1.27	-0.02	6.7	-0.1	.238	.234
PNL	-9.97	0.13	1.33		10.4		.225	.219
	-10.94	0.14	1.18	0.46	8.6	3.3	.235	.229
PART F: Individualized, planned flights when respondent home in data base								
SEL	-14.60	0.18	1.55		8.5		.263	.261
	-14.97	0.19	1.46	0.33	7.9	1.8	.267	.264
LA	-6.12	0.10	1.57		15.8		.242	.239
	-8.82	0.13	1.37	0.75	10.6	5.8	.263	.259
EPNL	-16.21	0.19	1.60		8.3		.271	.265
	-16.24	0.19	1.60	-0.01	8.3	0.0	.271	.265
PNL	-10.46	0.13	1.65		12.5		.260	.252
	-11.48	0.14	1.53	0.47	10.9	3.3	.269	.260

a. Part of this table is repeated from table II.
b,c,d,e. See corresponding footnotes in table H-1.

APPENDIX I:

CALCULATION OF SAMPLING VARIANCES AND IMPLICATIONS FOR STUDY FINDINGS

The primary units of observation in this study are single ratings of one day by one individual. These ratings can be considered to be a sample of the ratings which could have been obtained from all of the possible individuals, study areas, and study days which might be selected using similiar procedures in a series of similar studies. The rating units should thus be considered to be drawn from a complex "clustered" sample design. There are three types of clusters: clusters of ratings within individuals, clusters of individuals within neighborhoods, and clusters of ratings within study days. The clustering due to study day is crossed with, rather than nested within, the other two sample clustering characteristics. This complex clustering means that sampling errors can not be evaluated with the standard textbook formula which are based on simple random sampling assumptions.

Standard errors of the regression coefficients and the ratios of the regression coefficients have been estimated in this report using the bootstrap repeated replication technique (Diaconis and Efron, 1983). The bootstrap technique estimates the variance of the regression coefficients by calculating the regression coefficients for a series of samples which are drawn (without replacement) from the study sample. For this study, 250 of these replicated samples were created. The regression coefficients and ratios of regression coefficients were then calculated for each of the 250 replicated samples. The standard deviation of these 250 regression coefficients is then the standard error of the regression coefficient. An examination of the estimates of the standard deviations showed that the values had generally become quite stable after only 100 replications. In this exercise the sample was considered to be drawn from four study day strata: UH-60A low noise level stratum (controlled noise exposure days 1, 6, 10, 15), UH-1H low number of event stratum (days 2, 3, 5, 8), UH-1H high number stratum (days 11, 14, 16, 17) and a high noise level stratum (days 4, 7, 9, 12, 13).

The standard errors found in table III of the text are large enough to have affected the quality of the study results in two respects. The most obvious consequence is that the value of the decibel equivalent number effect is not closely specified. For the SEL estimate of "k_N" in Part A, the 95% confidence interval for the SEL estimate extends from $k_N = 1.9$ to $k_N = 14.3$.

A less obvious consequence of the large standard errors concerns bias in the estimate of the decibel equivalent number effect. Estimates of ratio means are biased when the coefficient of variation for the denominator is relatively high. The coefficient of variation for the partial regression coefficient for SEL in the first line of table III is 0.33 (0.33=0.20/0.06). Such a high coefficient of variation almost certainly means that the estimates of the decibel equivalent number effects in this table are upwardly biased. Examination of the values of k_N produced by the replications in the bootstrap analysis suggest that the

bias may be on the order of 10 percent. The estimate of the decibel equivalent number effect has not been adjusted for this bias both because the degree of the bias can not be estimated with adequate accuracy and because the size of the bias is almost certainly small relative to the size of the standard errors of the estimate. The standard errors are clearly much larger than is desirable. They are about three times as large as had been expected from pre-study estimates which were based on responses in conventional, long-term annoyance studies and on responses in laboratory studies. It appears that the large variances are primarily due to day-to-day variations in responses which are not accounted for by noise level. The support for this assertion comes from comparisons of the standard errors of k_N which were calculated with four different sampling assumptions.

For these comparisons the values of k_N and the standard errors of k_N were calculated four times using the responses of the 4178 respondents with the noise characteristics based on all the observed flights in the noise data base. When the actual complex sample structure is taken into account using the bootstrap repeated replication technique, then it was seen in table III that the standard error of k_N is 3.1. For a second (incorrect) estimate it was assumed that there is a simple random sample of 4178 observations. In this case the standard error of 1.08 was almost the same as the standard error of 1.10 which was calculated using a third technique, jackknife repeated replication, assuming that the 4178 observations were clustered into 29 study areas. When, however, the sample was considered to be a simple random sample of study days (each observation is the mean annoyance response for a study day), then the standard error increased to 2.74. These results would seem to indicate that the main source of inprecision in the study design is a large between-day variance in responses which is not accounted for by the acoustical parameters measured here. This suggests that a more accurate study design would need to include more study days. Further analyses of these data would be required before it would be possible to determine how numbers of people, areas, and study days should be combined to form efficient study designs.

APPENDIX J:

RELATIONSHIP BETWEEN 9-HOUR AND 24-HOUR ONE-DAY RATINGS

If there were an interest in ratings of 24-hour periods for single days then the relationship between the 9-hour ratings, used in this study, and 24-hour ratings of a single day noise environment would be of importance. If the respondents use a strict energy averaging approach and if the only noise events during a 24-hour period occurred during the 9 daytime hours, then it would be expected that a 24-hour rating would be the equivalent of about 4.3 decibels less. Given the regression slope of B_L=0.22, it would be expected that 24-hour ratings would average about 0.95 annoyance score points less.

To examine this relationship the standard interview was lengthened on the next-to-last interview day. After the standard telephone questionnaire had been read, the interviewer continued with questions concerning an entire 24-hour period starting from 5 PM on the previous day up through the 5 PM time which had been covered by the normal interview. (This modified version of the interview is reproduced in appendix B). The ratings of helicopters for the 9-hour and 24 hour period have been compared.

Of the 286 people who were interviewed and had been home for most of the 24 hours, 194 gave exactly the same rating for the 9-hour and 24-hour periods. Twenty-nine gave lower annoyance ratings for the 24-hour period (as expected from an energy averaging perspective) and 15 gave higher annoyance ratings for the 24-hour period. There appears, however, to have been some confusion in respondents' minds on this question. In spite of explicit instructions, 33 respondents were clearly inconsistent since they said they heard helicopters during the 9-hour day but then went on to report that they did not hear any helicopters during the 24-hour period which included that 9-hour day. Over the set of eight annoyance questions some 87 respondents were similarily inconsistent on at least one question. It thus appears that many respondents were in fact rating the nighttime period rather than the entire 24-hour period. A focus on nighttime events was evident in the spontaneous comments recorded during these interviews.

If the 87 respondents who definitely misunderstood the question are excluded, the 24-hour rating is -0.02 ($\pm$0.21) lower than the 9-hour rating. This indicates less of a reduction in annoyance than would be expected from an equivalent energy model (0.95 would be expected). Though this is the only estimate available not much importance should be attached to it. The interview question appears to not have been clearly understood. In fact it seems unlikely that respondents should be expected to be able to shift in a minute's time from a question which had been asked 20 times about a 9-hour period to a question which asks about 24 hours. A much more substantial investment in interview time and survey design would be needed to carefully measure the difference between the 9-hour and 24-hour one-day short-term ratings.