

## SECTION 4

### SURVEY RESULTS

#### **4.1 Period of Performance**

The 1000-person personal exposure measurement program started on October 1, 1997 with the preparation of the sampling plan, and the preparation of forms, meters, and all other material to be sent to the participants. The other milestones of the project were:

- The telephone interviews with potential participants started on October 8, 1997
- The first Explanatory Letters and Consent Forms were mailed to potential participants on October 22, 1997.
- The first signed Consent Form was returned by a participant on November 6, 1997, and the same day the first personal exposure meter was sent.
- The first meter was returned by a participant, after the measurements were made, on November 17, 1997.
- The program reached a steady flow of interviews, mailing and receiving Consent Forms, and mailing and receiving meters at the beginning of December 1997.
- After December 1, 1997, meters were processed at a rate of about 60 per week. This was possible because 180 meters were available for this project and the meter turnover time was 2 to 3 weeks.
- The last potential participant was interviewed on February 8, 1998.
- The last signed Consent Form was received and the last meter was sent on March 20, 1998.
- The last meter was received back from a participant on April 3, 1998.

Overall:

- 3,867 households were contacted,
- 1,796 persons were recruited by telephone for possible participation in the program,
- 1,718 persons were sent a Consent Form to sign (it was not necessary to send a Consent Form to the remaining 78 persons),
- 1,120 signed Consent Forms were returned,
- 1,079 persons were sent a meter (it was not necessary to send the meter to the remaining 41 people because the project goal of a sample of at least 1000 people was already achieved),
- 1,050 meters were returned in time for inclusion of the data in the final report,
- 1,012 meters had valid data.

Because of the desire to analyze and report the results of the survey to the EMF Engineering Review Symposium organized by the United States Department of Energy and scheduled for April 28-29, 1998, the first analysis was made on the data from the 853 persons who returned the meter with valid data by March 6, 1998. The results of this first analysis were reported in an Interim Report [7].

## 4.2 Sample Characteristics (Age, Gender, Region)

The participants' age, gender, and geographic characteristics are shown in Table 4-1. Participants from all the States participated in the program. They were grouped by four age groups, gender, and the 4 major regions of the U.S. (as classified by the U.S. Census Bureau). Because there were few children less than 5 year old, boys and girls of this age group were counted together. The numbers of Table 4-1 are expressed in Table 4-2 as percentages of the total number of participants. These percentages can be compared with those corresponding to the general U.S. population shown in Table 4-3.

**Table 4-1 Number of Participants by Age, Gender, and Region**

	Number of Participants to EMF Personal Exposure Survey							
	Total	<5	5-17	5-17	18-64	18-64	65+	65+
		M+F	M	F	M	F	M	F
Northeast	227	5	15	13	80	82	15	17
Midwest	257	4	9	15	85	96	21	27
South	322	12	25	13	98	122	25	27
West	206	7	13	7	80	73	11	15
U.S.	1012	28	62	48	343	373	72	86

**Table 4-2 Percentage of Participants for Different Age, Gender, and Region Groups**

	Survey Participants (percent of total)							
	Total	<5	5-17	5-17	18-64	18-64	65+	65+
		M+F	M	F	M	F	M	F
Northeast	22.43	0.49	1.48	1.28	7.91	8.10	1.48	1.68
Midwest	25.40	0.40	0.89	1.48	8.40	9.49	2.08	2.67
South	31.82	1.19	2.47	1.28	9.68	12.06	2.47	2.67
West	20.36	0.69	1.28	0.69	7.91	7.21	1.09	1.48
	100.00	2.77	6.13	4.74	33.89	36.86	7.11	8.50

**Table 4-3 Percentage of People in the U.S. Population for Different Age, Gender, and Region Groups (U.S. Census, 1996 data)**

	U.S. Population (percent of total)							
	Total	<5	5-17	5-17	18-64	18-64	65+	65+
		M+F	M	F	M	F	M	F
Northeast	19.44	1.32	1.76	1.67	5.85	6.07	1.10	1.66
Midwest	23.40	1.64	2.30	2.18	7.04	7.18	1.24	1.82
South	35.09	2.53	3.36	3.20	10.61	10.93	1.82	2.63
West	22.06	1.78	2.20	2.08	6.85	6.67	1.06	1.42
	100.00	7.27	9.63	9.13	30.36	30.85	5.23	7.53

### 4.3 Sample Characteristics (Activity Types, Occupation)

The 1,012 participants whose personal magnetic field exposure results are reported here had valid data for the entire 24-hour period or for a significant portion of it. The statistics of the 24-hour exposure data are the major goal of this project. However the survey provided the opportunity to analyze exposures corresponding to different types of activities. In fact, the participants recorded in the “activity diary” the time of the day when activity changes took place. Therefore, it was possible to analyze separately the periods of time corresponding to the following activities: entire 24-hour period, at home not in bed, in bed, at work, in school, during travel, and other (activities different from the previous ones and not specifically described, including shopping, visiting friends or relatives, attending sport events, participating in social activities outside the home, etc.). The number of people for whom data corresponding to different activities are available is shown in Table 4-4. Overall, the people in the entire sample reported spending 33.5% of the time at home not in bed, 34.2% in bed, 16.5% at work, 3.1% in school, 5.9% during travel, and 6.8% for other activities. If the reported duration were weighted to make the sample representative of the U.S. population (see Section 5.1), the above percentages would become: 33.9% at home not in bed, 34.6% in bed, 14.3% at work, 5.0% in school, 5.9% during travel, and 6.3% for other activities.

**Table 4-4 Number of Persons with Valid Exposure Data for Different Activities**

	Number of persons	Duration of period of activity (minutes)				
		Average Duration Reported	Average Duration Analyzed	5 <sup>th</sup> percentile	Period Analyzed 50 <sup>th</sup> percentile	95 <sup>th</sup> percentile
Entire Recording Period	1,012	1431	1429	1440	1440	1440
At Home not in Bed	1011	481	464	120	420	900
In Bed	996	497	490	340	480	660
At Work	525	454	445	100	480	710
In School	139	326	319	60	360	550
During Travel	765	111	89	10	60	270
Other	664	149	131	10	100	380

The participants were asked to report the occupation relevant to the period spent at work. Most participants recorded this information in the questionnaire sent with the meter. Occupations were subdivided in the categories shown in Table 4-5, following the Census Occupational Classifications.

**Table 4-5 Categories of Occupations Considered in the Magnetic Field Exposure Survey**

Category Type	Description	Occupational Code	Number of Work Exposure Data
1	Managerial and Professional Specialties	000 - 199	162
2	Technical, Sale, and Administrative Support	203 - 389	155
3	Service Occupations	403 - 469	58
4	Farming, Forestry, and Fishing	473 - 499	16
5	Precision Production, Craft, Repair, Operators, Fabricators, and Laborers	503 - 889	100
6	Electrical Occupations	(See note)	11
0	Not reported		23

Note: Electrical occupations are those classified as such by Dr. Samuel Milham [6] in his study of leukemia mortality in men occupationally exposed to EMF. The electrical occupations include: electronic technicians, radio and telegraph operators, electricians, linemen (power and telephone), television and radio repairmen, power-station operators, aluminum workers, welders and flame cutters, motion-picture projectionists, electrical engineers, streetcar and subway motormen.

#### **4.4 Sample Characteristics (Residence and Power Line Characteristics)**

The characteristics of the residence were reported by the participants when they filled out a questionnaire mailed to them with the meter. The characteristics of the residences obtained from the questionnaires are shown in Table 4-6. The distance between residence and power line and the power line type are shown in Table 4-7. The line types are shown in the figures of page 56 of Appendix A.

**Table 4-6 Characteristics of the Residences Reported by the Participants**

Residence Type	Number	Bedroom		Residence		Water Line	
		Floor	Number	Size	Number	Type	Number
Single Family	695	Basement	27	< 1000 square feet	238	Metal	556
Duplex	43	1 <sup>st</sup> Floor	586	1000-2000 square feet	527	Plastic	215
Apartment with < 5 Floors	123	2 <sup>nd</sup> Floor	300	> 2000 square feet	190	Both	27
Apartment with 5+ Floors	13	3 <sup>rd</sup> Floor or Higher	38				
Mobile Home	65						
No data	42	No data	45	No data	57	No data	214
<b>Total</b>	<b>1012</b>	<b>Total</b>	<b>1012</b>	<b>Total</b>	<b>1012</b>	<b>Total</b>	<b>1012</b>

**Table 4-7 Distance Between Residence and Power Line and Line Characteristics**

Overhead Power Line				Power Line Type	Number
Visible within 150 ft	Distance	Number	Visible within 150 ft	1) 1-Phase Primary	274
	< 25 ft	134		2) 2-Phase Primary	138
	25 - 50	324		3) 3-Phase Primary	183
	> 50 ft	306		4) Two 3-Phase Primaries	104
	No Data	5		5) Transmission, Vertical	25
			6) Transmission, Delta	13	
			7) Transmission, Flat	11	
			8) 2-Circuit Transmission	10	
			No Data	11	
Subtotal		769	Total		769
Not visible within 150 ft		196			
No data		47			
Total		1012			

**4.5 Results (Tables)**

The results of the personal exposure survey for each participating person are shown in Appendix B. Appendix B contains four tables:

Table B-1 lists the person’s gender, age, and region.

Table B-2 lists the answers given by the participants to the questionnaire on their occupational and residential environments. The questionnaire is shown at page 53 of Appendix A.

Table B-3 lists the magnetic field exposure data for each person and for each period of activity (entire day, at home not in bed, in bed, at work, in school, during travel, and other).

Table B-4 lists the weight of each sample person. This weight takes into account the chance of selection of the person in the sample and the refusal rate of each group of people in the sample. Groups were characterized by gender (male and female), age group (0-4, 5-17, 18-64, 65 and older), and region (Northeast, South, Midwest, and West). This weight can be interpreted as the number of persons in the population that the sample person is representing. In addition to the list of base weight, Table B-4 contains also 50 “replicate weights” which were used to calculate the standard error for nationally representative estimators according to the jackknife method (see Section 5.3).