ORNL/TM-2008/113

DATA COLLECTION, QUALITY ASSURANCE, AND ANALYSIS PLAN FOR THE 2008/2009 HYDROGEN AND FUEL CELLS KNOWLEDGE AND OPINIONS SURVEYS

R. L. Schmoyer
Tykey Truett
Susan Diegel

September 2008

Prepared by the
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831-6073
Managed by
UT-BATTELLE, LLC
For the
U.S. DEPARTMENT OF ENERGY
Under contract No. DE-AC05-00OR22725

Prepared for the
Hydrogen Program
Office of Energy Efficiency and Renewable Energy
U.S. DEPARTMENT OF ENERGY
Washington, D.C.

TABLE OF CONTENTS

ACRONYMS

AAPOR	American Association for Public Opinion Research
CASRO	Council of American Survey Research Organizations
CATI	Computer assisted telephone interview
CD	Compact disk
D&B	Dun & Bradstreet
DEP	Department of Environmental Protection
DOE	Department of Energy
DOT	Department of Transportation
IAFC	International Association of State Fire Chiefs
ICC	International Code Council
NAICS	North American Industry Classification System
NASFM	National Association of State Fire Marshals
NFPA	National Fire Protection Association
OMB	Office of Management and Budget
ORNL	Oak Ridge National Laboratory
RDD	Random digit dialing
SAS	Statistical Analysis System
SEO	State Energy Office

ABSTRACT

The 2008/2009 Knowledge and Opinions Survey, conducted for the Department of Energy's Hydrogen Program will measure the levels of awareness and understanding of hydrogen and fuel cell technologies within five target populations: (1) the general public, (2) students, (3) personnel in state and local governments, (4) potential end users of hydrogen fuel and fuel cell technologies in business and industry, and (5) safety and code officials. The ultimate goal of the surveys is a statistically valid, nationally based assessment.

Distinct information collections are required for each of the target populations. Each instrument for assessing baseline knowledge is targeted to the corresponding population group. While many questions are identical across all populations, some questions are unique to each respondent group.

The biggest data quality limitation of the hydrogen survey data (at least of the general public and student components) will be nonresponse bias. To ensure as high a response rate as possible, various measures will be taken to minimize nonresponse, including automated callbacks, cycling callbacks throughout the weekdays, and availability of Spanish speaking interviewers. Statistical adjustments (i.e., sampling weights) will also be used to account for nonresponse and noncoverage.

The primary objective of the data analysis is to estimate the proportions of target population individuals who would respond to the questions in the various possible ways. Data analysis will incorporate necessary adjustments for the sampling design and sampling weights (i.e., probability sampling). Otherwise, however, the analysis will involve standard estimates of proportions of the interviewees responding in various ways to the questions. Sample-weight-adjusted contingency table chi-square tests will also be computed to identify differences between demographic groups.

The first round of Knowledge and Opinions Surveys was conducted in 2004. Analysis of these surveys produced a baseline assessment of technical knowledge about hydrogen and fuel cells and a statistically valid description of opinions about safety and potential usage in the United States. The current surveys will repeat the process used in 2004. In addition the 2008/2009 survey results will be compared with the 2004 baseline results to assess changes in knowledge levels and opinions. In 2011/2012, the surveys will be repeated, and changes in knowledge and opinions will again be assessed.

The information gained from these surveys will be used to enhance and update the DOE Hydrogen Program's education efforts.

1. INTRODUCTION

The U.S. Department of Energy (DOE) Hydrogen Program integrates hydrogen and fuel cells subprograms, coordinates research efforts, and communicates information through educational activities. An effective education effort is critical to ensuring acceptance of hydrogen and fuel cell technologies.

1.1. BACKGROUND

For DOE's hydrogen education program to be effective, it needed a logical starting point—a characterization of hydrogen technology awareness. Thus, a literature review was conducted to attempt to characterize this knowledge level.[1] The literature review concluded that very few scientific surveys had been conducted to ascertain knowledge levels about hydrogen.[2]

In response to the above finding, statistically designed surveys of four different populations in the United States (general public, students, state and local government agencies, and potential end users) were conducted in 2004 to measure the level of awareness and understanding of hydrogen and fuel cell technologies[3]. The results of these surveys provide a baseline for knowledge and opinions about hydrogen and fuel cells. An analysis of the results was presented in a technical report,[4] and plans were made to use the baseline for comparison with future knowledge and opinions surveys.

Table 1.1 shows the number of respondents in each population group in the 2004 survey. The table also shows the composite average percentage of correct responses to eleven technical questions that were asked as part of each of the four surveys. The highest average score was for state and local government officials.

Table 1.1. Number of responses and average score for each of the four survey populations included in the 2004 hydrogen survey

Population	Total completed interviews	Average % correct on technical questions
General public	889	32.8
Students	1,000	32.2
State and local government officials	246	65.8
Potential end users	99	44.4

[1] Truett, Tykey, *Literature Review for the Baseline Knowledge Assessment of the Hydrogen, Fuel Cells, and Infrastructure Technologies Program,* ORNL/TM-2003/258, http://cta.ornl.gov/cta/Publications/Reports/ORNL_TM_2003_258.pdf, October 2003.

[2] The literature review will be updated during 2008.

[3] Approval to conduct the surveys was obtained from the Office of Management and Budget (OMB).

[4] Schmoyer, R. L., Tykey Truett, and Christy Cooper, *Results of the 2004 Knowledge and Opinions Surveys for the Baseline Knowledge Assessment of the U.S. Department of Energy Hydrogen Program,* ORNL/TM-2006/417, http://cta.ornl.gov/cta/Publications/Reports/ORNL_TM_2006_417.pdf , April 2006.

Analysis of the 2004 survey also showed that, for every population group, technical understanding appears to influence opinions about safety.[1] For the general public, student, and end user surveys, respondents with above-average scores on the eleven technical questions were more likely to have an opinion about hydrogen technology safety, and for those respondents who expressed an opinion, their opinion was more likely to be positive. These differences were statistically significant. The 2004 survey findings also indicated that all populations knew more about hydrogen than about fuel cells.

1.2. SURVEY OBJECTIVES

The 2008/2009 Knowledge and Opinions Survey is intended to measure the levels of awareness and understanding of hydrogen and fuel cell technologies within the same four populations that were surveyed during 2004, plus one additional population group. The five populations to be surveyed during 2008/2009 are (1) the general public, (2) students, (3) personnel in state and local governments, (4) potential end users of hydrogen and fuel cell technologies in business and industry, and the additional group (5) safety and code officials. The ultimate goal of the hydrogen surveys is a statistically valid, nationally based assessment of awareness and understanding of hydrogen and fuel cells for each of these target populations. The same processes used for data collection in 2004 will be used for the 2008/2009 surveys, and the same methods will be used for the data analysis of individual surveys. In addition, however, the 2008/2009 findings will also be compared with the 2004 findings to assess changes in knowledge levels and opinions from the 2004 baseline. The information from the current assessment will be used to decide whether hydrogen education strategies should be modified and, if so, how.

1.3. ABOUT THIS REPORT

This report documents plans for collecting, analyzing, documenting, and ensuring quality assurance of data for the five hydrogen survey components. Survey results and analysis will be documented in a report, which will be publicly available.

1.4. SURVEY METHODOLOGY

Distinct information collections are required for each of the target populations. These collections will be conducted in stages, with the general public study conducted first. Changes relative to baseline knowledge levels will be determined through comparison with the 2004 survey results. Five populations will be surveyed; however, the general scope and temper of all five collections will be the same. All questions are in a closed-end format, and all collections will be conducted using computer-assisted telephone interviews (CATI). In 2011/2012, each population group will be surveyed again using the same survey instrument and methodology.

The surveys test knowledge of hydrogen, including its basic properties and uses, and seek participant opinions about the use of hydrogen as an energy carrier, including opinions about

safety. Questions related to media use for obtaining energy information are posed to all population groups. In addition, specific questions directed to each user group assess that group's opinions on specific issues pertinent to that population. Copies of the survey questionnaires will be included in the final analysis report. The results of the 2008/2009 data collections will be compiled as for the 2004 data collection.

1.4.1. Types of respondents

All surveys will be conducted by telephone interviewing. The general public will be surveyed first. For the general public, a random digit dialing (RDD) survey of adults, age 18 and over, will be conducted. The student component (students ages 12-17) will also be selected using RDD. The third population, state and local government agencies, will consist of three state-level offices in all 50 states, plus the twelve largest cities and counties in each of the four Census regions. The state and local government agencies will be surveyed completely (i.e., statistical sampling will not be used). Potential end users of hydrogen and fuel cells (the fourth population of interest) will also be interviewed. End users will be selected from and grouped by usage characteristics: transportation agencies, users needing uninterrupted power, and users who have needs for large amounts of power. Finally, officials in the areas of safety and code will be surveyed. Additional information about these populations is provided in Sections 2-3.

1.4.2. Estimated number of respondents

The number of desired respondents differs for each of the populations. The general public survey will consist of interviews with 1,000 adults; the student survey is planned to include 1,000 students; the total number of contacts with state and local agencies will be approximately 250; about 600 interviews will be with end users; and 200 interviews with safety and code officials are planned. The number of respondents in each population group is shown in Table 1.2; the rationale for these sample sizes is discussed in Section 2.

Table 1.2. Number of responses expected for each of the five survey populations in the 2008/2009 hydrogen survey

Population	Total planned responses
General public	1,000
Students	1,000
State and local government officials	246
Potential end users	600
Safety and code officials	200

1.4.3. Timeframe

The Paperwork Reduction Act (44 United States Code 3501 et seq.) requires approval by the OMB prior to conducting the surveys. Approval for conducting follow-on surveys of the four populations surveyed in 2004 was received on July 11, 2007. In early 2008, Federal Register

Notices were published and application was made to OMB to conduct the survey of safety and code officials.

A contract was let with Opinion Research Corporation (a public opinion research firm) December 2007. The first survey was initiated in January 2008, and the first four surveys (general public, students, government agencies, and end users) were completed by the end of July 2008. It is expected that all five surveys will be completed in 2008.[5]

A complete report containing an analysis of all results of the 2008/2009 surveys and a comparison with the baseline analysis will be produced by Oak Ridge National Laboratory (ORNL) and published on the DOE Hydrogen Program website.

1.4.4. Coverage and Response Rates

In recent studies about hydrogen knowledge and opinions, methodologies for collecting data have included CATI surveys, face-to-face interviews, computer-based questionnaires completed electronically, and focus groups.[6] The CATI RDD survey methodology used to conduct the DOE hydrogen knowledge assessment surveys has been employed for many years. Its strengths and weaknesses have been studied, and telephone survey researchers (and OMB) are aware of them. For example, over the last thirty years, coverage rates (the proportion of the target populations from which samples are drawn) have been high in CATI RDD surveys because nearly all of the target populations have had landline telephones. On the other hand, response rates in CATI surveys have often been low (e.g., less than 25%). However, despite low response rates, because of inherent efficiency and low costs, CATI surveys have been a popular method in survey research.

In the last few years, however, there has been a sudden decline in the coverage rate in landline telephone surveys because of steep increases in the proportion of "cell-phone-only" individuals. This issue is discussed in several recent publications.[7, 8, 9, 10] According to Blumberg,[11] "If the compound growth rate in 2007 and 2008 remains as it was in 2003-2006,

---

[5] Completion of the survey of safety and code officials is dependent on OMB approval.
[6] See Truett, Tykey, Rick Schmoyer, and Christy Cooper, *Compendium: Surveys Evaluating Knowledge and Opinions Concerning Hydrogen and Fuel Cell Technologies*, Oak Ridge National Laboratory Technical Report, to appear in 2008.
[7] Blumberg, Stephen J., Julian V. Luke, and Marcie L. Cynamon. "Telephone Coverage and Health Survey Estimates: Evaluating the Need for Concern About Wireless Substitution," *American Journal of Public Health*, 96(5) (May 2006).
[8] Lavrakas, Paul J., Charles D. Shuttles, Charlotte Steeh, and Howard Fienberg. "The State of Surveying Cell Phone Numbers in the United States, 2007 and Beyond," *Public Opinion Quarterly*, 71(5), 840-854 (2007).
[9] Link, Michael W., et al. "Practicability of Including Cell Phone Numbers in Random Digit Dialed Surveys: Pilot Study Results from the Behavioral Risk Factor Surveillance System," http://www.fcsm.gov/07papers/Link.II-C.pdf (accessed 2008).
[10] ZuWallack, Randal S. "Piloting Data Collection via Cellular Phones: Results, Experiences, and Lessons Learned," Macro International Inc. (white paper), http://www.orcmacro.com/Survey/CellPhone/Cell%20phone%20white%20paper.pdf (September 2007).
[11] Op. cit.

then more than 25% of U.S. households will only have cell phones during the second half of 2008."[12] The cell-phone-only problem is thus becoming substantial.

Coverage and response rates are discussed further in Section 2.

1.5. ANALYSIS PLAN OVERVIEW

The primary data quality issue in this study is bias due to nonresponse. Nonresponse bias will be addressed through aggressive follow-up, careful CATI procedures, and by accounting for nonresponse in the data analysis, through adjustments made to sampling weights.

Although nonresponse and coverage bias are potential problems in a CATI or any other survey, they are less likely to be a problem in this survey, at least in comparison with baselines, because of the tendency for biases to cancel in the comparisons. That is, because the same methods will be used to field the surveys over time, nonresponse bias in the baseline surveys will be similar to the nonresponse bias in subsequent surveys. When differences between the baseline and subsequent estimates are computed, the bias will tend to subtract out. To a lesser extent this is also true for coverage bias.

Data analysis procedures are described in Section 3. Data will be analyzed to estimate proportions of individuals in each target population who respond to the questions in various ways. Sampling weights will be used to adjust the estimates (to account for probability sampling). Cross-tab (contingency tables) analyses will be performed to investigate relationships between responses and age, gender, geographic region, and other demographic characteristics, as appropriate. Cross-tab analyses will be adjusted for the survey designs (e.g., stratification) and sampling weights. Other exploratory and graphical analyses will be performed.

In 2011/2012, the surveys will be repeated, and results will be compared with the baseline results of 2004 and with the results of the 2008/2009 surveys. Results for the different target populations will also be compared. These comparisons will be fairly straightforward, because the surveys conducted at different times and the different survey components are all statistically independent.

[12] See http://www.pollster.com/blogs/cell_phones_and_political_surv.php .

2. DATA COLLECTION AND QUALITY ASSURANCE

This section deals with quality assurance procedures implemented to ensure correctness in: sampling (Section 2.1); sample sizes (Section 2.2); coverage issues (Section 2.3); minimizing and accounting for nonresponse (Section 2.4); survey questionnaires (Section 2.5); and data analysis (Section 2.6).

2.1. SAMPLE SELECTION

The respondent universe for the general public survey is non-institutionalized U.S. adults (ages 18 and over), approximately 200 million people. The sampling method is random digit telephone dialing (RDD) using the Genesys system for generating samples.[13] This approach to public opinion surveys is standard and widely used. For example, it was used by the Bureau of Transportation Statistics for their *Omnibus Household Survey.*[14] Genesys samples are implicitly stratified by Census Division and Metropolitan Statistical Area size (i.e., they are sorted by these variables before systematic sampling). The samples include both listed and unlisted residential telephone numbers. The system is updated twice a year. For purposes of statistical sampling, the general public population is essentially infinite.

Households for the general public survey will be contacted using CATI methods. Random selection of adults within a given household will be according to most recent birthday. The sample size for the public survey will be 1,000 completed interviews.

For the student survey, a national sample of telephone numbers will be randomly generated as described for the general public survey. A much lower proportion of these numbers will be eligible, however, because only students age 12-17 will be eligible for interviewing. If a household contains multiple teenagers, random selection of the interviewee within the household will be according to most recent birthday. The sample size for the student survey is also 1,000 completed interviews. An OMB requirement of the student surveys is that parental permission must be obtained before interviews with students. This is a likely to be a serious obstacle in conducting these surveys, as they are sure to be encumbered with nonresponse for many other reasons as well.

The targeted sample size for the state and local government agencies is 246 completed interviews. The state agencies of interest were State Energy Offices (SEOs), Departments of Environmental Protection (DEPs),[15] and Departments of Transportation (DOTs). A total of 150 state responses are expected (one per state for each of the three state agencies). The process used to obtain contact information for state agencies is provided in Appendix A.

---

[13] Marketing Systems Group, "GENESYS," http://www.m-s-g.com/genesys/genesyshme.htm .
[14] Bureau of Transportation Statistics, "Omnibus Survey," http://www.bts.gov/omnibus/household/general_methodology.html.
[15] For the purposes of this document, state environmental offices are called Departments of Environmental Protection. The agency name, however, varies by state. Equivalent agency names include Department of Environmental Quality, Department of Environment, or Department of Natural Resources.

Functionally similar personnel working for cities or counties (local governments) are also of interest. Because small cities or counties are not expected to be able to respond to the survey now or in the near future, the target populations are the 12 largest cities and 12 largest counties in each of the Northeast, Midwest, South, and West Census Regions. For each Census Region, all 12 of the largest cities and counties will be sampled. A total of 96 local responses are expected. (If county and city governments are combined into a single government entity, only one call will be made to that office, and the next largest county in that census region will be selected for interviewing.) Contact lists have been generated to identify the appropriate person to interview in each office. The process used to obtain contact information for local agencies (cities and counties) is provided in Appendix A.

Potential hydrogen end users are businesses and industries with potential commercial uses of hydrogen and/or fuel cells. However, respondents to the end user survey do not need to be using hydrogen or fuel cells at the time of the survey interview. Although respondents could have global corporate operations, it is required that they have facilities in the United States, and only personnel in the United States will be interviewed. Potential persons to be interviewed include chief executive officers, chief financial officers, facility managers, energy managers, fleet managers, and information/security managers.

As in the 2004 survey, eligible businesses, identified according to the North American Industry Classification System (NAICS), will be stratified into three sectors of hydrogen usage or potential hydrogen usage:

- Transportation: private and public fleets that use trucks, buses, or other ground-based vehicle types; these are the end users (not developers) of hydrogen-powered vehicles.
- Business types for which energy usage is primarily for facility heating/cooling and localized power requirements and for which on-site power generation is important because of the need for an uninterrupted power supply. These business types include large agricultural productions; hospitals and other healthcare institutions; education institutions; and financial institutions.
- Industrial sectors that have large power requirements—examples include processing, manufacturing, and fabrication plants; mills and refineries; and industrial machinery and equipment plants.

Component population numbers for each of these three categories are shown in Table 2.1. Lists of businesses meeting the above criteria will be purchased from Dun & Bradstreet, (specifically the D&B Market Place database) or comparable vendors. In addition to the NAICS code, the lists include the number of employees and revenues for each listed business. The contact lists are the most recently available for this type of data.

For each NAICS category, businesses in the compiled lists will be ranked by either number of employees or revenue, depending on which is considered more appropriate for the category. For the transportation stratum and for the stratum of businesses needing uninterrupted power supplies, the number of employees will be used primarily as the ranking criterion for NAICS categories (revenue will be used for a few subcategories); for the stratum of industrial

businesses with large power requirements, revenue will be used for all categories. The largest 0.3% of businesses will then be selected from each category and will be used as the sampling frames from which interviewees will be chosen. The largest businesses will be selected because they represent the greatest potential for hydrogen usage. For each stratum, these largest businesses will then be sampled randomly to obtain 200 respondents, as indicated in Table 2.1.

In the 2004 study, 488 phone numbers were used to get 99 respondents, for a response rate of approximately 20%. For the 2008 survey, 600 respondents are required (200 in each of the three sectors). Assuming the same response rate in 2008 as in 2004, approximately 1,000 interviews in each sector must be attempted to get the required number of completions. Given the number of businesses in the top 0.3% of each component population (see Table 2.1), there should be just enough (i.e., 1,001) in transportation and extras in the other two sectors. As a precaution, a reserve pool consisting of the next largest 0.3% of businesses in each component population will also be identified, to be used in the event that the top 0.3% is exhausted before 200 interviews are completed. The reserve pool, if used at all, is only expected to be needed (and then only minimally) for the transportation sector.

Table 2.1. Populations and interview plans for the three sectors in the end user population group

Hydrogen usage sector	**Number in component population***	**Number in top 0.3% of population**	Number of completed interviews	**Number of attempted interviews****
Transportation	333,623	1,001	200	≈ 1,000
Businesses needing uninterrupted power supplies	877,549	2,633	200	≈ 1,000
Industrial sectors with large power requirements	657,810	1,973	200	≈ 1,000
Total	**1,518,871**	**5,607**	**600**	**≈ 3,000**

*Based on the Census Bureau's 2002 Economic Census. Note that sampling will be restricted to the largest 0.3% of these populations, if possible.
**Based on 20% response rate obtained in 2004 survey.

The population group of safety and code officials will be identified in a manner similar to that used for other state government agencies. Four safety and code organizations will be polled:

- International Code Council (ICC), 50 total responses,
- National Fire Protection Association (NFPA), 50 total responses,
- National Association of State Fire Marshals (NASFM), 50 total responses, and
- International Association of Fire Chiefs (IAFC), 50 total responses.

The ICC develops codes used in the construction of residential and commercial buildings, including homes and schools. Most U.S. states and large cities and counties that adopt codes choose codes developed by the ICC. If there is more than one ICC office per state, the plan is to interview the office at the state capital. [16]

The official list of contacts will be supplied by the DOE Hydrogen Program office. Because the above organizations (and not the employees working for them) are the sampling frame, this survey will be a census (complete sample). Estimates computed from it will therefore be free of sampling error, except perhaps for a very small amount introduced by the minimal nonresponse that could occur.

2.2. REQUIRED ACCURACY

Although RDD methods are complex, the general public survey is simple enough that a reasonable approximation in reckoning necessary sample sizes (given the more complicated development needed to account exactly for the stratification and probability sampling) is to treat the sampling as simple random sampling. The actual data analysis will more properly account for stratification and the sample weights. A standard approximation in deciding necessary sample sizes is the normal approximation to the binomial, under which confidence limits for an observed proportion $\hat{p}$ are approximately $\hat{p} \pm Z \times [\hat{p}(1-\hat{p})/n]^{1/2}$, where n is the number of respondents and Z is a quantile of the standard normal distribution. This approximation is known to be good when n is large (e.g., $n > 100$), and $\hat{p}$ is between 0.1 and 0.9. Under these conditions, a sample size of 1,000 respondents leads to the ± three percentage point margin of error with 95% confidence (i.e., when Z=1.96), which is the often-quoted margin of error for surveys with respondents numbering around 1,000.

However, an unusual feature of the hydrogen surveys is the possibility of high frequencies of negative responses (don't know, have no opinion, etc.) on some of the survey questions. For example, if 95% of responses are in the "don't know" category (i.e., $\hat{p} \approx 0.95$), then the usual confidence limits based on the normal approximation to the binomial distribution would most likely not be a good approximation. (For $\hat{p}$ near either 0 or 1, since $\hat{p}(1-\hat{p})$ is nearly zero, the standard error $(\hat{p}(1-\hat{p})/n)^{1/2}$ is approximately zero, which is a poor approximation because p will not be known with certainty even if $\hat{p}$ is exactly 0 or 1.) For $\hat{p} > 0.9$ or $\hat{p} < 0.1$, exact confidence limits based on the binomial distribution can be used, rather than the normal approximation to the binomial. For example, suppose every response in a sample of 1,000 is a "don't know." Then a 97.5% exact lower confidence bound (i.e., lower 95% two-sided confidence bound) for the true proportion of "don't knows" is 0.996 (as opposed to 1.0 on the basis of the normal approximation). If, instead, 950 are "don't knows," then the lower confidence bound is 0.935. If 900 are "don't knows," then the lower confidence bound is 0.880. This approach also demonstrates that a sample size of 1,000 is adequate for $\hat{p}$ in the 0-0.1 or 0.9-1 ranges.

[16] For more information about the ICC see http://www.iccsafe.org/. See also the following websites for information about the three fire protection associations: NFPA: http://www.nfpa.org/; NASFM: http://www.firemarshals.org/; IAFC: http://www.iafc.org/.

If $\hat{p}$'s are expected to be in the 0-0.1 or 0.9-1 ranges, then it could be argued that a sample size of 1,000 is excessive. In fact, for the 2004 survey, most of the $\hat{p}$'s turned out to be in the usual 0.1-0.9 range, and so the sample size of 1,000 was both reasonable and standard. Furthermore, because of the fixed costs for programming and setting up a CATI application, there would be little cost savings in targeting fewer than 1,000 responses. All of the above arguments for the general public survey apply to the survey of students as well.

The state and local government survey and the safety and code officials survey will be censuses (not random samples). Estimates computed from the results of these surveys will have little to no statistical error.

The end user survey is a smaller sample (600 total respondents) than that of students or the general public. Using the approximation discussed above, but with a sample size of 600 (rather than 1,000), the margin of error is ±4%. Although this is slightly larger than the margins of error for the general public and student surveys, it is still considered adequate.

2.3. COVERAGE

For the general public and student surveys, coverage (i.e., the proportion of the population included in the sampling frame) is imperfect because not every individual in the target populations can be reached by telephone. As discussed in Section 1.4.4, however, coverage has not been considered an important issue in most traditional RDD surveys conducted in the last thirty years, because in fact only a small proportion of individuals could not be reached by traditional landline telephone. Recently, however, the advent of individuals who have a cell phone but no traditional landline telephone has begun to threaten the good coverage of traditional RDD surveys.

According to the sources listed in Section 1.4.4, cell-phone-only individuals are most frequently in the 20-35 age bracket. Corrections for under-sampling this age bracket can be made in the survey data analysis by assigning higher post-stratification weights (a weighting adjustment in the data analysis) to individuals in this age group. However, age-based weighting corrections cannot be used to properly adjust for inherent differences between cell-phone-only and landline individuals of the same age. Furthermore, it is reasonable to speculate that cell-phone-only individuals could be more aware of technology in general (and thus hydrogen technology in particular) than individuals with landline phones only or even both landline and cell phones. Failure to address the cell-phone-only coverage deficiency in traditional landline surveys could thus be a concern in the DOE hydrogen technology awareness survey, particularly the RDD surveys of the general public and students.

An obvious remedy to the cell-phone-only coverage issue is to supplement traditional CATI RDD landline phone surveys with cell-phone components. However, obstacles to cell-phone supplements include imposition on respondents, who bear cell phone usage costs in "minutes," and laws such as the federal Telephone Consumer Protection Act, which requires that unsolicited calls to cell phones have to be dialed by hand rather than a computer. How to

properly weight cell-phone-only, cell-and-landline, and landline-only respondents in a combined survey is also the subject of current research.

These issues are being addressed by survey research firms and in big survey studies such as the Behavioral Risk Factor Surveillance System,[17] the world's largest ongoing public health telephone survey. Although sampling weights will provide a partial correction, it is not feasible to fully address the cell-phone-only issue in the 2008 DOE Hydrogen Knowledge and Opinion Surveys. It is very likely, however, that methods for dealing with this problem will have been developed by 2011. Because of continued increases in the number of cell-phone-only individuals, the issue will have to be addressed for the 2011/2012 DOE surveys.

2.4. RESPONSE RATES

2.4.1. Definition of nonresponse

The Council of American Survey Research Organizations (CASRO) definition of response rate[18] is as follows:

Response Rate =

$$\frac{\textit{Number of Complete Interviews}}{(\textit{Number Sampled Eligible}) + [(\textit{Number Sampled but Eligibility Undetermined}) * e]}$$

where e = (*Number Known Eligible*)÷(*Number Known Eligible* + *Number Known Ineligible*).

This definition is the same as the "RR3" definition used by the American Association for Public Opinion Research (AAPOR).[19] AAPOR has also extended this definition to allow for partially completed interviews. However, because nearly all of the survey questions can be answered with a simple "don't know" or "no opinion" response, partially complete interviews will not be counted as responses. Thus we will use the AAPOR "RR3" response rate definition. These adjustments will be used to calculate response rates for all survey components except the surveys of state and local government agencies and safety and code officials. For these two populations, the nonresponse rate is expected to be minimal and will be estimated simply as (*Number of Complete Interviews*) ÷ (*Number of Interviews Targeted*).

Nonresponse rates for the 2004 surveys as well as call disposition frequencies were reported in the final report for those surveys.[20] The same methods will be employed for the 2008/2009

[17] Link, Michael W., et al., op cit.
[18] Frankel, Lester R. "The Report of the CASRO Task Force on Response Rates," in *Improving Data Quality in a Sample Survey,* 1983.
[19] AAPOR, "Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys Revised 2008," 2008.
[20] Schmoyer, R. L., Tykey Truett, and Christy Cooper, *Results of the 2004 Knowledge and Opinions Surveys for the Baseline Knowledge Assessment of the U.S. Department of Energy Hydrogen Program,* ORNL/TM-2006/417, http://cta.ornl.gov/cta/Publications/Reports/ORNL_TM_2006_417.pdf , April 2006.

survey,[21] and nonresponse, cooperation, and refusal rates will be compared, as they are themselves relevant in the context of public interest in hydrogen, as well as survey sampling.

2.4.2. Nonresponse bias

The approach to dealing with nonresponse in the hydrogen surveys is similar to approaches taken in similar surveys, for example, the *Omnibus Household Survey* (see Section 2.1). Nonresponse will be minimized through careful and aggressive callbacks. Sampling weights (general public and student surveys) will be adjusted to account for nonresponse. However, further follow-ups, for example by mail or in-person interviews, will not be made. Although following up a sample of "first-stage" nonresponders (those who do not complete the survey despite repeated call-backs) with an aggressive second-stage (via mail or in-person visits) does allow survey estimates to be computed for the first-stage nonresponders, such approaches are expensive and are considered beyond the scope of the hydrogen surveys.

In lieu of statistical estimates for first-stage nonresponders (or other assumptions), some nonresponse bias must be tolerated, and nonresponse bias is probably the major data quality limitation of the hydrogen survey data. Because the 2008/2009 fielding of the survey will be implemented with exactly the same methods as those used in 2004, much of the nonresponse or coverage bias will subtract out in the cross-time differences. Nevertheless, even the cross-time comparisons could be biased:

- Changes among responders could be different from changes among nonresponders.
- Changes in telephone technology because of the frequency of use of call blocking and caller ID technologies could affect comparisons over time. (Note that unlisted numbers do not affect RDD surveys.)
- Changes over time in general attitudes, such as willingness to participate in phone surveys, could adversely affect comparison over time.

These issues are important; however, they also should not be overestimated. A study of increasing nonresponse rates in telephone surveys reports "more numbers out of scope (including mobile phones, fax/modems/ pagers) … 27.4 percent in 1995 versus 35.1 percent in 2000 pretest," and "more numbers with the scope not determined … 6.8 percent of the numbers in sample had scope not determined in 1995 versus 8.6 percent in 2000."[22] Although these changes are substantial, they also do not appear to be so big as to be overwhelming. Furthermore, because of the recent introduction of state and federal telemarketer no-call lists, which will greatly reduce the number of nuisance phone calls, it is possible that response rates will increase again in the future. (Note that firms conducting survey research are exempt from no-call lists).

[21] Nonresponse rates for the 2008 surveys will be discussed further and call disposition frequencies and nonresponse rate estimates will be reported in the final report.
[22] McGuckin, Nancy, Mary Ann Keyes, and Susan Liss, "Hang-ups – Looking at Nonresponse in Telephone Surveys," 2002.

Thus, we are willing to incur some nonresponse bias, because reasonable measures will be taken to minimize it (e.g., CATI methods for scheduled call backs, adjustment of sampling weights to account for nonresponse), and because of the expense of alternatives (e.g., mail or in-person follow-up surveys).

2.4.3. Maximizing response rates

"CATI" (computer assisted telephone interview) refers to the methodology by which telephone numbers are dialed (e.g., using the Genesys system) and by which responses are recorded using programmed computer formats. In the hydrogen surveys, the actual interviews are always conducted by individuals who have been well-trained in interviewing techniques[23] to avoid "hang-ups" and otherwise minimize nonresponse.

Procedures in this study for maximizing response rates exceed usual standards for CATI surveys. Interviewers will make a minimum of 15 attempts to reach eligible households. Each call attempt will use a minimum of five rings. For the general public and student surveys, the CATI software will cycle the attempts in the following order: weekday day, weekday evening, Saturday day, and Sunday evening to maximize coverage of the residential population. Sample allocation and scheduling of interview sessions assure a minimum of three attempts in each day part (e.g., weekday day, weekday evening, weekend). For the government, end user, and safety and code officials surveys, calls will be made during normal business hours for the time zone being called.

For all surveys, lines that are busy will be called back a minimum of five times at 10-minute intervals. If the line is still busy after the fifth attempt, the number will be attempted again on different calling occasions. If the line is still busy after the fifth calling occasion, the CATI system will attempt to contact the phone company to ascertain whether the number is actually in service.

The 2004 baseline general public survey was conducted to accommodate the special feature that relatively large proportions of "don't know" and "no opinion" responses were expected. The relationship of correct, incorrect, and "don't know" responses for the general public for the eleven technical questions is shown in Figure 2.1. Respondents were assured that "don't know" and "no opinion" were perfectly acceptable answers to the survey questions. This helped to minimize item nonresponse rates for the 2004 survey. The same assurances will be provided to interviewees in 2008/2009.

CATI surveys accurately handle large numbers of scheduled call back appointments. When a scheduled appointment time arrives, the CATI system finds the next available station and delivers the appropriate phone number for the next call. Ensuring that appointments are kept helps to maximize response rates (and to minimize imposition on study participants). The CATI system also allows for callbacks to rescheduled interviews and to restart interrupted

[23] AAPOR, "Best Practices for Survey and Public Opinion Research," http://www.aapor.org/bestpractices .

interviews (for example, if a respondent wants to terminate an interview but to finish it later). Scheduled call backs can be either casual (general time) or definite (exact time) depending on the respondent's request. The CATI system also automatically handles callbacks for no-answer, busy, and answering machines. Call backs for busy signals are retried at several minute intervals; callbacks for no-answer and answering machines are scheduled to ensure coverage at different times of day.

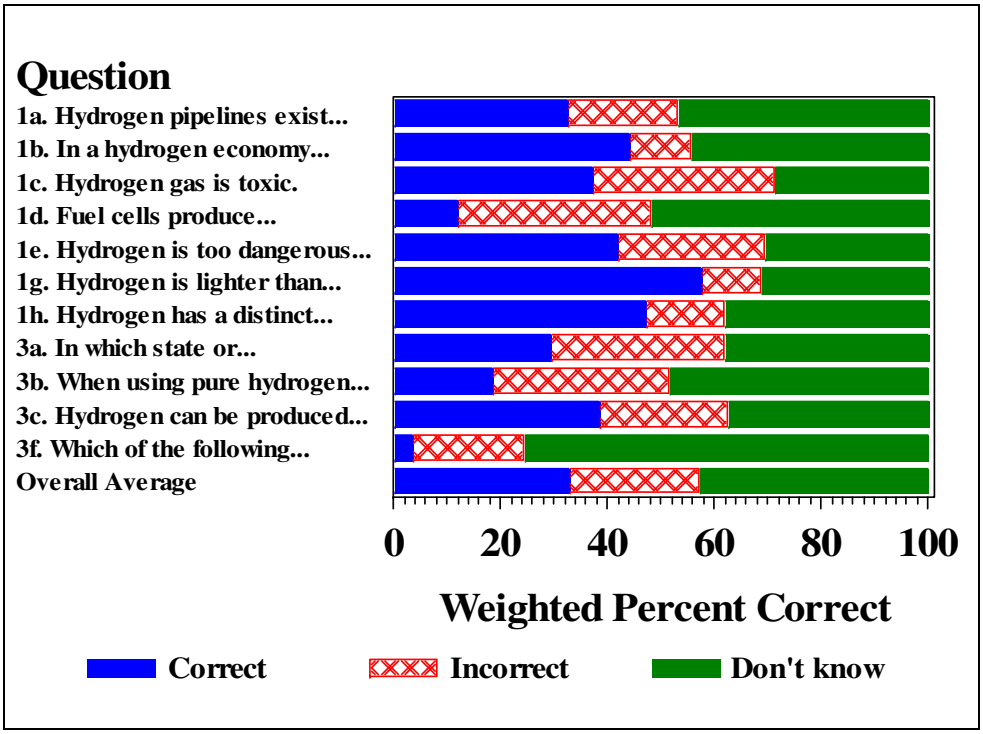

Figure 2.1. Weighted percent correct, incorrect, and "don't know" for the technical knowledge questions asked during the 2004 hydrogen and fuel cell survey of the general public. (For the full questions, see http://cta.ornl.gov/cta/Publications/Reports/ORNL_TM_2006_417.pdf.)

Another step that will be taken to maximize response rates is to route each initial refusal to special survey staff trained and experienced at converting initial refusals to responses. How initial refusals are handled will be decided on the basis of each particular case and the experience by the special staff member. One technique that will be used when appropriate is to switch from an English to a Spanish-speaking interviewer.

2.4.4. Statistical adjustments for nonresponse

For the general public and student surveys, sampling weights will be computed to adjust for variable selection probabilities in the random sampling. These weights will be further adjusted to account for households with multiple phones (including transfers), number of eligible household members, and for response rate (and coverage rate) differences over various demographic subgroups. (Weights will be adjusted upwards for groups with higher

nonresponse rates.) The state and local government, end user, and safety and code officials surveys will not be weighted, because, for these surveys, selection probabilities are uniform across the target populations.

2.5. PRETESTING

For the 2004 surveys, a formal pilot study of 50 general public respondents was conducted as a part of the OMB-approved information collection. This pilot study was used as a basis for final adjustments to the questions, served as a check on response rate estimates and the CATI system, and served as a quality assurance check for the methods of data analysis. Results of these 50 respondents in the pretest were not included in the analysis of the general public survey since changes had been made to the survey instrument.

Because the 2008/2009 surveys are substantially similar to the 2004 surveys, none of the 2008/2009 survey questionnaires will be pretested.

2.6. QUALITY ASSURANCE IN THE DATA ANALYSIS

CATI technology and the multiple-choice nature of the survey questions precluded out-of range data entries. Survey data and all programs written to analyze the results for the 2004 surveys were carefully logic-checked and "sanity-checked" through examination of the output (tables, charts, etc.). While performing the data analysis, all project materials, including survey design documentation, results of the survey, and data analysis programs and results were backed up to secondary storage media. After the analysis of the 2004 surveys and issue of the final report, this information was also archived to compact disks (CDs) and stored at multiple locations.

Similar quality assurance procedures will be applied for the 2008/2009 survey processes and procedures.

3. DATA ANALYSIS

3.1. OBJECTIVES OF DATA ANALYSIS

For each possible response to each survey question, there is a proportion of individuals in the survey target population who would give that response. The primary endpoints of the statistical analysis of the 2004 survey data were estimates of those proportions and standard errors and confidence limits for those estimates. Certain composite results, such as the average proportion of correct answers to the survey technical questions, are also of primary interest. In the 2008/2009 fielding of the survey, the primary endpoints will include these endpoints and also estimates of ***changes*** in these endpoints relative to the 2004 baseline.

In addition to the primary findings, the survey results will also be analyzed for secondary information, much of which will be of great interest and relevance in formulating a hydrogen education program. This secondary information includes how responses differ with demographic characteristics (age, sex, geographic region). (For the general public and student surveys, this includes knowledge assessment by age, gender, geographic region; attitudes and opinions by age, gender, geographic region; sources of energy information by age, gender, geographic region; and choosing a power supply by age, gender, geographic region.) Also of secondary but great interest will be cross tabulations showing the relationships between different factors. These crosstabs will include: knowledge level compared with attitudes and opinions; knowledge level compared with source of energy information; and attitudes and opinions compared with source of energy information. For the state and local government, end user, and safety and code officials surveys, the only respondent demographic characteristic to be recorded is geographic region.

3.2. DATA TYPES

Responses to the survey questions will be of several different data types. Responses to the multiple choice questions as well as true/false/don't know questions are simple (unordered) multinomial data. With the exception of a "don't know/no opinion" response, responses to the rating questions are ordinal (ordered) multinomial data. Because of the "don't know/no opinion" category, however, responses to the rating questions are not strictly ordered. Finally, for the general public and government surveys, there is also a ranking question, in which five items are ranked in importance (in the context of a hydrogen economy) by the respondent. The items are (a) safety, (b) cost, (c) the environment, (d) convenience, and (e) performance.

3.3. ESTIMATES AND TESTS

In addition to data types, another important consideration in the data analysis is the application of sampling weights (general public and student surveys only), which are used to adjust estimates and tests for variable selection probabilities as well as nonresponse and non-coverage. Proper adjustment with sampling weigh is necessary but restricts the set of appropriate software available for the data analysis. Estimates and tests computed for the data

analysis will account for survey stratification as well as sampling weights. Sampling weights will be computed from selection probabilities adjusted for nonresponse, households with multiple telephone numbers, and (by iterative proportional fitting) post-stratification by age, sex, and region (general public and students only; the state and local government, end user, and safety and code officials surveys will be stratified but not weighted).

The following general approach will be taken in the data analysis. Results for each of the survey questions will be analyzed with the Statistical Analysis System (SAS) Surveyfreq procedure to produce one-way (i.e., specific by exactly one classification variable) summary tables of frequencies, percentages, and standard errors for the various response categories. These statistics are weighted and account for the design stratification. The one-way statistics will be explored by examining charts for each survey question, and additional charts will be computed to illustrate various features of interest observed for multiple questions in the one-way tables.

Results for the survey technical questions will be combined to form overall scores. In the overall scores, "credit" will be given only for correct answers to the technical questions; no credit will be given for "don't knows." The overall scores will be charted and analyzed with the SAS Surveymeans procedures, which handles continuous (as opposed to categorical) data such as the overall technical question scores. For the general public survey, the preference ranking results for safety, cost, environment, convenience, and performance will be analyzed with the Surveymeans procedure. (The pairwise preference results, components of the ranking, will also be analyzed as part of the one-way analyses.) Like the Surveyfreq procedure for categorical data, the Surveymeans procedure also properly accounts for sampling weights and stratification.

As noted earlier, there was a significant percentage of "don't know" and "no opinion" responses for the eleven technical questions in the 2004 survey. An increase (or decrease) in the proportions of people having an opinion on these questions will be of interest in the 2008/2009 and 2011/2012 surveys.

Relationships will be explored between the question responses and various demographic variables such as sex, census region, age category, educational degree, and whether the respondent's overall technical question score is above or below average. The SAS Surveymeans procedure (also used to compute the one-way tables) will be used to compute statistical significance levels for the association between question responses and the demographic variables.[24]

Finally, response rates will be determined using the formula in Section 2.4.1.

[24] Many of the most highly significant relationships for the 2004 surveys were discussed in the report by Schmoyer, Truett, and Cooper.

3.4. COMPARISON OF RESULTS WITH BASELINE

The results of the 2008/2009 survey will be statistically independent of the 2004 baseline survey. Hence, once results are obtained, statistical tests about changes can be made in the usual way: the variance of each difference is the sum of the variances of the differenced quantities, and tests (e.g., t-tests) about differences can be computed by relating estimated differences to their standard errors. Once the 2004 and 2008/2009 estimates and standard errors are computed (the technically more difficult step, particularly for the surveys with sampling weights), cross-survey comparisons are relatively straightforward.

Because the survey of safety and code officials was not fielded in 2004, the 2008/2009 survey of this group will establish the baseline of knowledge and opinions for this population. Changes with respect to this baseline will be measured when the survey is fielded again in 2011/2012.

The following questions will be addressed in the comparison of the 2008/2009 findings with the 2004 baseline. (Other issues may also be addressed.)

- For each population group, how have the average numbers of correct, incorrect, and don't know responses to the technical questions changed?
- For each population group, have opinions about the safety of hydrogen and fuel cell technologies changed? If so, how? Is the change statistically significant?
- Have there been changes in the media sources used by respondents to obtain energy information?
- How have respondent concepts of timeframes for implementing hydrogen technologies changed?
- Have response rates for the surveys changed?

4. CONCLUSION

Results of the analysis of the 2008/2009 surveys and the comparison of the 2008/2009 findings with the findings of the 2004 baseline will be presented in a report containing text, tables, and graphs.

The biggest data quality limitation of the hydrogen survey data is nonresponse bias. We are willing to accept this bias, because reasonable measures are being taken to minimize it (Section 2.4.3). We expect that any changes in response rates will not be substantial enough to obscure measurements of changes in knowledge of, awareness of, and attitudes toward hydrogen.

The primary objective of the data analysis is to estimate the proportions of target population individuals who would respond to the survey questions in the various possible ways. Data analysis will incorporate necessary adjustments for the sampling design and sampling weights. Otherwise the data analysis will mostly involve straightforward estimation of proportions of the respondents providing various answers to the questions. Sample-weight-adjusted contingency table chi-square tests will also be computed to further identify differences between demographic groups.

After the findings of the 2008/2009 surveys are analyzed, the results will be compared with the results of the 2004 surveys. This comparison will measure changes in knowledge levels, opinions about hydrogen safety, and attitudes about hydrogen and fuel cell technologies.

After all analyses and documentation are complete, all processes, programs, and products will be archived for use in 2011/2012 when the surveys will be repeated.

REFERENCES

The American Association for Public Opinion Research. *Standard Definitions: Final Dispositions of Case Codes and Outcome Rates for Surveys. 5th edition*. Lenexa, Kansas: AAPOR, 2008. (http://www.aapor.org/uploads/Standard_Definitions_07_08_Final.pdf)

AAPOR, "Best Practices for Survey and Public Opinion Research," http://www.aapor.org/bestpractices .

Blumberg, Stephen J., Julian V. Luke, and Marcie L. Cynamon "Telephone Coverage and Health Survey Estimates: Evaluating the Need for Concern About Wireless Substitution," *American Journal of Public Health*, 96(5) (May 2006).

Bureau of Transportation Statistics, "Omnibus Survey," http://www.bts.gov/omnibus_surveys/household_survey/general_methodology.html.

Frankel, Lester R., "The Report of the CASRO Task Force on Response Rates," in: *Improving Data Quality in a Sample Survey*, edited by Frederick Wiseman, Cambridge, Massachusetts, Marketing Science Institute, 1983.

Lavrakas, Paul J., Charles D. Shuttles, Charlotte Steeh, and Howard Fienberg. "The State of Surveying Cell Phone Numbers in the United States, 2007 and Beyond," *Public Opinion Quarterly*, 71(5), 840-854 (2007).

Link, Michael W., et al. "Practicability of Including Cell Phone Numbers in Random Digit Dialed Surveys: Pilot Study Results from the Behavioral Risk Factor Surveillance System," http://www.fcsm.gov/07papers/Link.II-C.pdf (accessed 2008).

Marketing Systems Group, "GENESYS," http://www.m-s-g.com/genesys/genesyshme.htm.

McGuckin, Nancy, Mary Ann Keyes, and Susan Liss, "Hang-ups—Looking at Nonresponse in Telephone Surveys," International Conference on Travel Survey Methods, (http://www.fhwa.dot.gov/ohim/hang_ups.htm), 2002.

Schmoyer, R. L., Tykey Truett, and Christy Cooper, *Results of the 2004 Knowledge and Opinions Surveys for the Baseline Knowledge Assessment of the U.S. Department of Energy Hydrogen Program,* ORNL/TM-2006/417, http://cta.ornl.gov/cta/Publications/Reports/ORNL_TM_2006_417.pdf , April 2006.

Truett, Tykey, *Literature Review for the Baseline Knowledge Assessment of the Hydrogen, Fuel Cells, and Infrastructure Technologies Program,* ORNL/TM-2003/258, http://cta.ornl.gov/cta/Publications/Reports/ORNL_TM_2003_258.pdf , October 2003.

Truett, Tykey, Rick Schmoyer, and Christy Cooper. *Compendium: Surveys Evaluating Knowledge and Opinions Concerning Hydrogen and Fuel Cell Technologies*, Oak Ridge National Laboratory Technical Report, to appear in 2008.

ZuWallack, Randal S. "Piloting Data Collection via Cellular Phones: Results, Experiences, and Lessons Learned," Macro International Inc. (white paper), http://www.orcmacro.com/Survey/CellPhone/Cell%20phone%20white%20paper.pdf (September 2007).

APPENDIX A. PROCESS FOR OBTAINING CONTACT INFORMATION FOR THE STATE AND LOCAL GOVERNMENT AGENCIES

The following instructions were followed to obtain the state and local government contact data used for the 2008/2009 survey. After the list was compiled, the contact information was sent to Christy Cooper (DOE) for approval.

Because the contact information was used by the public opinion research firm, names, titles, affiliations, and phone numbers were required. The contact information was also used to send out letters to each of the proposed interviewees; therefore, address information (U.S. mail and email if available) was needed.

Process for getting contact information for State DOTs

Go to "State Departments of Transportation," at https://fhwaapps.fhwa.dot.gov/foisp/staffnetStateDOT.dot and copy appropriate information into an Excel file, which can be manipulated for multiple uses.

Do not copy the information for the territories (e.g., American Samoa).

Note that contact names may be incorrect on the website and further research may be needed on the actual State DOT website.

Process for getting contact information for State Energy Offices

A list of "NASEO State/Territory Offices," was obtained from www.naseo.org/members/states/default.aspx . When this website is accessed, a map appears. State Energy Office information is available for each state by clicking on the individual state.

Some editing of the data may be needed [e.g., delete the pictures of the State flags and the entries for the territories (e.g., American Samoa)].

Process for getting contact information for State EPAs

Go to EPA's website "State Environmental Agencies," at http://www.epa.gov/epahome/state.htm.

Finding the right office to interview is tricky. Some States have only one office listed; some (such as California) have several. Try first for an office with EPA in the title. Second choice is an office with conservation in the title. (Try to avoid the websites that seem to deal only with

hunting and fishing licenses.) Search among the links until you can find a State's environmental website with contact information (e.g., look at Arkansas, which is simple). Copy the name of the office, name and title of the "top" official (directors, commissioners, secretaries, etc.), address, phone number, and the website url where you got this information into an Excel file, which can be manipulated for multiple uses.

Note: by the time the 2011/2012 surveys are conducted, there may be an easier way to obtain this information for the State EPA organizations.

Process for getting contact information for cities

At the time of the 2008/2009 survey, the website http://usmayors.org/USCM/cgi-bin/database_search4.asp was used. This website is no longer active and has been replaced by http://www.usmayors.org/meetmayors/mayorsatglance.asp . For the 2011/2112 survey, it may be necessary to find an updated source.

A list of the twelve largest cities in each Census Region was extracted from city population data at http://www.census.gov/popest/cities/files/SUB-EST2006-IP.csv. From the Mayor's website, search for each city. This leads to a separate website for the Mayor's office of that city.

From the website for the appropriate Mayor's office, copy the following into an Excel file.

- Mayor name
- Complete mailing address
- Phone number
- Fax (if available)
- Email (if available)
- URL for the city website where this information was found

Process for getting contact information for counties

A list of the largest counties in each Census Region was extracted from county population data obtained from http://www.census.gov/popest/counties/files/CO-EST2006-ALLDATA.csv. This list includes more than twelve counties because sometimes a county and city government are consolidated into a single metropolitan government. Duplication of city-county contacts must be avoided.

Go to
http://www.naco.org/Template.cfm?Section=Data_and_Demographics&Template=/cffiles/counties/MSAs.cfm or to
http://www.naco.org/Template.cfm?Section=Find_a_County&Template=/cffiles/counties/usamap.cfm .

Depending on which website is used, the process is slightly different. Essentially the information that is wanted is the website of the appropriate county in the appropriate state.

Therefore, find the appropriate state and select the desired county.

Next, and very important: if the county has the same top official as one of the cities for which information has already been copied, do not use this county. Instead, skip to the next largest county on the list. The point of this caution is that some city-county governments are consolidated, and two responses are not needed from the same office.

Copy the following into an Excel file that can be manipulated for multiple uses.

- State and county name
- Person in charge (e.g., mayor or county executive; may be more than one)
- Complete mailing address
- Phone number
- Fax (if available)
- Email for county mayor/county executive (if available)
- URL for the county website where this information was found

Continue until contact information is compiled for twelve counties.