

Supporting Statement Part B

Study on Uranium in Bedrock Wells in South-East New Hampshire (NHWELL)

OMB Control Number: 1028-NEW

B. Collections of Information Employing Statistical Methods

The agency should be prepared to justify its decision not to use statistical methods in any case where such methods might reduce burden or improve accuracy of results. When the question “Does this ICR contain surveys, censuses, or employ statistical methods?” is checked "Yes," the following documentation should be included in Supporting Statement B to the extent that it applies to the methods proposed:

1. Describe (including a numerical estimate) the potential respondent universe and any sampling or other respondent selection method to be used. Data on the number of entities (e.g., establishments, State and local government units, households, or persons) in the universe covered by the collection and in the corresponding sample are to be provided in tabular form for the universe as a whole and for each of the strata in the proposed sample. Indicate expected response rates for the collection as a whole. If the collection had been conducted previously, include the actual response rate achieved during the last collection.

Potential Respondent Universe and Sampling Selection Method

In the south-east New Hampshire study unit, drinking water is supplied from public and private sources. People living in large metropolitan areas and large cities and towns are generally connected to public supplies that come from surface-water reservoirs, stratified-drift aquifers, or bedrock aquifers. People living in rural communities and on the outskirts of metropolitan areas generally obtain their water from private wells drilled into the bedrock aquifers, with some private wells in glacial sand and gravel aquifers.

The number of private bedrock wells in the south-east New Hampshire bedrock well database has been estimated at 12,052, determined from a query of bedrock wells in study in the region (Table 1). The New Hampshire Department of Environmental Services (NHDES) maintains a database of private well owners (names and addresses) for the state of New Hampshire. We will use their database to sample potential respondents in our study area.

Table 1. Bedrock well population and sample size in south-east New Hampshire.

South-east New Hampshire Study Area	Estimated Number of Bedrock Wells in Study area	Potential Respondents	Targeted Response Number
Rockingham County	8,055	2,685	150
Strafford County	1,362	454	100
Hillsborough County	2,635	878	100
Total	12,052	4,017	350

The respondent universe will be stratified based on location and proximity of bedrock wells in Rockingham, Strafford, and Hillsborough counties. We will follow the sampling methods described by Scott (1990) to ensure that the wells chosen for this study are randomly distributed. We will use the same distribution of randomly selected wells from a previous arsenic study in the region and supplement where needed with wells from the NHDES database, according to the methods described in Montgomery and others, 2003 (<http://pubs.usgs.gov/fs/fs-051-03/>).

Colman, J.A., 2011, Arsenic and uranium in water from private wells completed in bedrock of east-central Massachusetts—Concentrations, correlations with bedrock units, and estimated probability maps: U.S. Geological Survey Scientific Investigations Report 2011–5013, 113 p.

Dillman, D.A., Smyth, J.D., and Christian, L.M, 2009, Internet, mail, and mixed-mode surveys: The tailored design method: John Wiley & Sons, Inc., Hoboken, New Jersey, 499 p.

Scott, J.C., 1990, Computerized stratified random site- selection approaches for design of ground-water- quality sampling network: U.S. Geological Survey Water-Resources Investigations Report 90-4101, 109 p.

Montgomery, D.L., Ayotte, J.D., Carroll, P.R., and Hamlin, Patricia, 2003, Arsenic concentrations in private bedrock wells in southeastern New Hampshire: U.S. Geological Survey Fact Sheet FS 051–03, 6 p.

2. Describe the procedures for the collection of information including:

- * **Statistical methodology for stratification and sample selection,**
- * **Estimation procedure,**
- * **Degree of accuracy needed for the purpose described in the justification,**
- * **Unusual problems requiring specialized sampling procedures, and**
- * **Any use of periodic (less frequent than annual) data collection cycles to reduce burden.**

Statistical methodology for sample selection:

To ensure that any new wells chosen for this study are randomly distributed we will use a grid based computer program to produce equal area and random cells (Scott, 1990). The program will be used to subdivide the region into equal-area polygons, referred to as units. Within each unit, primary, secondary, and tertiary points will be randomly assigned by the computer software. Each well within approximately a 1-mile radius of each primary point will be identified and randomly ordered. The wells will then be reviewed sequentially to determine if they are suitable for sampling. If none of the wells within a 1-mile radius of the primary point are determined to be adequate, wells around the secondary point will be identified and randomly ordered and so on.

Each point will be assigned a number and those locations will be used to approximate the corresponding address of the well owner in the NHDES database. For each round of mailing sample bottle kits to the selected homeowners, we estimate that approximately 30 percent, or about 100 to 120 homeowners, to respond positively to the request for a water sample. For those cell areas where a negative or no response is received within 10 days, we will follow the process described above to select a replacement homeowner from the secondary points; and repeat the process until the required 350 samples are received. We expect to mail 1,200 post cards that ask permission of the homeowner to participate in this study in order to receive the required 350 samples needed to conduct this study.

Because uranium and other trace-metal concentrations vary among rock types by several orders of

magnitude, we estimate that our sample area will be sufficient to indicate whether or not differences among rock types are statistically significant. One objective of the project is to determine if rock type can explain a substantial amount of the variance in the total data set. Because of this, we cannot assess the degree of accuracy we will have before we have completed the sampling.

We believe that the current level of local community involvement surrounding this topic will assist in providing a high response rate. Concerns about possible elevated concentrations of uranium and other trace metals that naturally occur in some aquifers that provide drinking water to south-east New Hampshire is being addressed by NHDES and the USGS.

We will adhere to follow-up procedures for mail surveys outlined in Dillman and others (2009) to ensure an 80% response rate. Steps taken to maximize this response rate are described in question 3 below.

The survey instrument will include five fixed alternative questions, the instructions for conducting a water sample, and one question asking if the respondent would be willing to participate in a potential follow-up study. The respondents will be asked the following questions about their:

- 1) level of knowledge about the water in their home wells,
- 2) knowledge of selected facts about the presence of naturally occurring elements in their drinking water, and
- 3) one demographic question.

The selected facts and technical terms have been developed in conjunction with USGS hydrologists, NHDES and the U.S. Environmental Protection Agency (EPA). The question format follows that of a recent study (Colman, 2011) conducted in the adjacent state of Massachusetts (<http://pubs.usgs.gov/sir/2011/5013/>) where well owners collected water samples that were returned to the USGS using materials provided in sampling kits.

3. Describe methods to maximize response rates and to deal with issues of non-response. The accuracy and reliability of information collected must be shown to be adequate for intended uses. For collections based on sampling, a special justification must be provided for any collection that will not yield "reliable" data that can be generalized to the universe studied.

Following a modified *Tailored Design Method*, (Dillman 2007) we will employ the following steps: (1) a postcard (see attachment 1B) will be sent to each potential respondent explaining that an important survey will soon be sent to them. The purpose of the postcard is three-fold: (a) it gives the recipient an opportunity to decline participation; (b) it helps identify undeliverable addresses in the sample, and, therefore, reduces mailing costs; and (c) it helps increase the response rate by emphasizing the importance of the survey; (2) An initial mailing of the survey instrument will be sent, which will include a cover letter (see attachment 2B) explaining the importance of the survey, the survey instrument, water sampling kit, and self addressed return envelope; (3) a first follow-up postcard thank you note or reminder (see attachment 3B) will be sent one week after the initial survey mailing; (4) a second follow-up letter (see attachment 4B) will be mailed to all non-respondents three weeks after the initial mailing; (5) a third follow-up letter will be mailed to all non-respondents 7 weeks after the initial mailing (see attachment 5B); (6) if the response rate is less than 80%, a follow-up telephone call will be made to the remaining non-respondents asking them to participate in the survey.

These efforts are expected to yield a response rate of 80%.

- 4. Describe any tests of procedures or methods to be undertaken. Testing is encouraged as an effective means of refining collections of information to minimize burden and improve utility. Tests must be approved if they call for answers to identical questions from 10 or more respondents. A proposed test or set of tests may be submitted for approval separately or in combination with the main collection of information.**

A survey instrument was reviewed by the three peer-reviewers listed in question 8 (Part A) and by a USGS Social Science Researcher (Fort Collins, CO) to ensure clarity and comprehension prior to this submission. It was subsequently revised based on their comments.

- 5. Provide the names and telephone numbers of individuals consulted on statistical aspects of the design and the name of the agency unit, contractor(s), grantee(s), or other person(s) who will actually collect and/or analyze the information for the agency.**

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Attachment 1. Map of the south-east New Hampshire study area showing geologic units and random well locations.

