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**QUALITY ASSURANCE PROJECT PLAN
FOR THE
NATIONAL PESTICIDE SURVEY OF DRINKING WATER WELLS
SURVEY STATISTICS, DATA COLLECTION AND PROCESSING**

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**QUALITY ASSURANCE PROJECT PLAN
FOR THE
SURVEY STATISTICS, DATA COLLECTION AND PROCESSING**

2. TABLE OF CONTENTS

<u>Section</u>	<u>Pages</u>	<u>Revisions</u>	<u>Date</u>
1. TITLE AND APPROVAL PAGE	2	0	3/14/90
2. TABLE OF CONTENTS	1	0	3/14/90
3. PROJECT DESCRIPTION	2	0	3/14/90
3.1 Data Collection Design and Timing			
3.2 Improving Quality Versus Measuring Quality			
4. PROJECT ORGANIZATION AND RESPONSIBILITIES	7	0	3/14/90
5. COMMUNITY WATER SYSTEM SURVEY TASKS AND QUALITY ASSURANCE PROCEDURES	22	0	3/14/90
5.1 Community Water System Screening Survey			
5.2 Community Water System Field Survey			
6. DOMESTIC WELL SURVEY TASKS AND QUALITY ASSURANCE PROCEDURES	23	0	3/14/90
6.1 Second-Stage County Agent Interview			
6.2 DWS Screening Survey			
6.3 Domestic Water System (DWS) Field Survey			
<u>Appendices</u>			
A. CWS SCREENING SURVEY TRAINING MANUAL	1	0	3/14/90
B. BLANK COPIES OF THE CWS QUESTIONNAIRE, CWS TEAM LEADER INTRODUCTION AND WELL OBSERVATION RECORD, AND LOCAL AREA QUESTIONNAIRE	1	0	3/14/90
C. CALCULATION OF CLUSTER SPECIFICATIONS	1	0	3/14/90
D. STANDARD OPERATING PROCEDURES	3	0	3/14/90
E. DOMESTIC WELL SCREENING SURVEY TRAINING MANUAL	1	0	3/14/90
F. DOMESTIC WELL SURVEY INTERVIEWER TRAINING MANUAL	1	0	3/14/90

3. PROJECT DESCRIPTION

The National Pesticide Survey (NPS) is designed to meet two major objectives: (1) to determine the frequency and concentration of pesticide contamination in the drinking water wells of the nation, and (2) to better understand how pesticide contamination is associated with patterns of pesticide usage and the vulnerability of groundwater to pollution. A statistical design ensures that the wells sampled represent 13 million private domestic wells and all 51,000 community well systems throughout the U.S. Approximately 1,350 domestic and community wells will be surveyed between 1988 and 1990.

This QAPjP outlines the Survey statistics, questionnaire data collection and processing procedures for community and domestic drinking water wells. For both the Community Water System (CWS) and Domestic Well Surveys these procedures involve developing and implementing methodologies to select approximately 1,350 wells for sampling and questionnaire administration. Due to the inherent differences in domestic and community water wells, the procedures for data collection and processing are slightly different. The data collection and processing procedures for the CWS drinking water well Survey are addressed in Chapter 5 and those for the Domestic Well Survey are addressed in Chapter 6.

Section 5.1 outlines the tasks of sample selection; questionnaire preparation; questionnaire administration; data preparation; and selection of field sample for the screening portion of the CWS Survey. Section 5.2 outlines the tasks of questionnaire preparation; interviewer training; materials preparation and mailout; monitoring of field activities and questionnaire receipt; initial editing and initial data retrieval; data preparation and data entry; and data reduction, analysis, and reporting for the field portion of the CWS Survey.

Section 6.1 briefly describes the Second-stage County Agent Questionnaire interview. Section 6.2 outlines the tasks of questionnaire preparation; preparation of county-specific questions; sample selection; questionnaire administration; and selection of field sample for the screening Survey portion of the Domestic Well Survey (DWS). Section 6.3 outlines the tasks of questionnaire preparation; interviewer training; questionnaire receipt; questionnaire administration; initial editing and initial data retrieval; data preparation and data entry; data reduction, analysis, and reporting; and systems security and data backup and archival for the field portion of the Domestic Well Survey.

Included at the end of this QAPjP are appendices that contain Standard Operating Procedures, copies of relevant questionnaires, and training manuals.

3.1 Data Collection Design and Timing

The CWS data collection effort will consist of two main parts: a screener Survey and the main Survey. The screener will consist of short telephone interviews in early 1988 with approximately 7,000

CWSs identified from the Federal Reporting Data System (FRDS). From the results of this screener a stratified sample of approximately 600 eligible CWSs will be drawn for participation in the main survey. The main data collection effort will be conducted from late summer 1988 until the end of calendar year 1989. Westat will draw both samples, conduct the screener Survey, and assist ICF in training interviewers and samplers for the main Survey.

The domestic well data collection effort will also consist of a screener and a main Survey. Westat will conduct a random digit dialing (RDD) screener in 84 counties to identify eligible households with wells. Westat interviewers will conduct the interviews in the main Survey and assist ICF in sampling the domestic water wells. Unlike, the CWS, the DWS screener and main Survey are conducted in parallel. The main Survey will be in the field from the spring of 1988 until early 1990, with the screener Survey (except for the six pilot counties) generally taking place one to two months in advance of the field work for any particular county.

3.2 Improving Quality Versus Measuring Quality

For survey errors, there are two philosophies to consider. In Groves' book *Survey Errors and Survey Costs* (John Wiley & Sons, 1989) he compares, "... efforts to *reduce* the various errors afflicting surveys and efforts to *measure* the errors. On the side of reduction are scores of efforts to train interviewers...examples of question wording that improves the quality of the information collected, and efforts to improve response rates...." "In sharp contrast to this research [are studies]...designed to estimate their magnitudes."

In implementing the NPS, ICF and Westat will concentrate efforts on improving quality rather than measuring its absolute level. (For some activities it also will be possible to estimate errors, e.g. response rates, but our priority will be on reducing errors.) Thus our QA activities will deal with minimizing errors at every stage of the process, whether it is selecting a sample, training interviewers, or processing the data. This Quality Assurance Project Plan describes the efforts undertaken to minimize errors and increase quality as part of Survey statistics, data collection, and processing activities.

4. PROJECT ORGANIZATION AND RESPONSIBILITIES

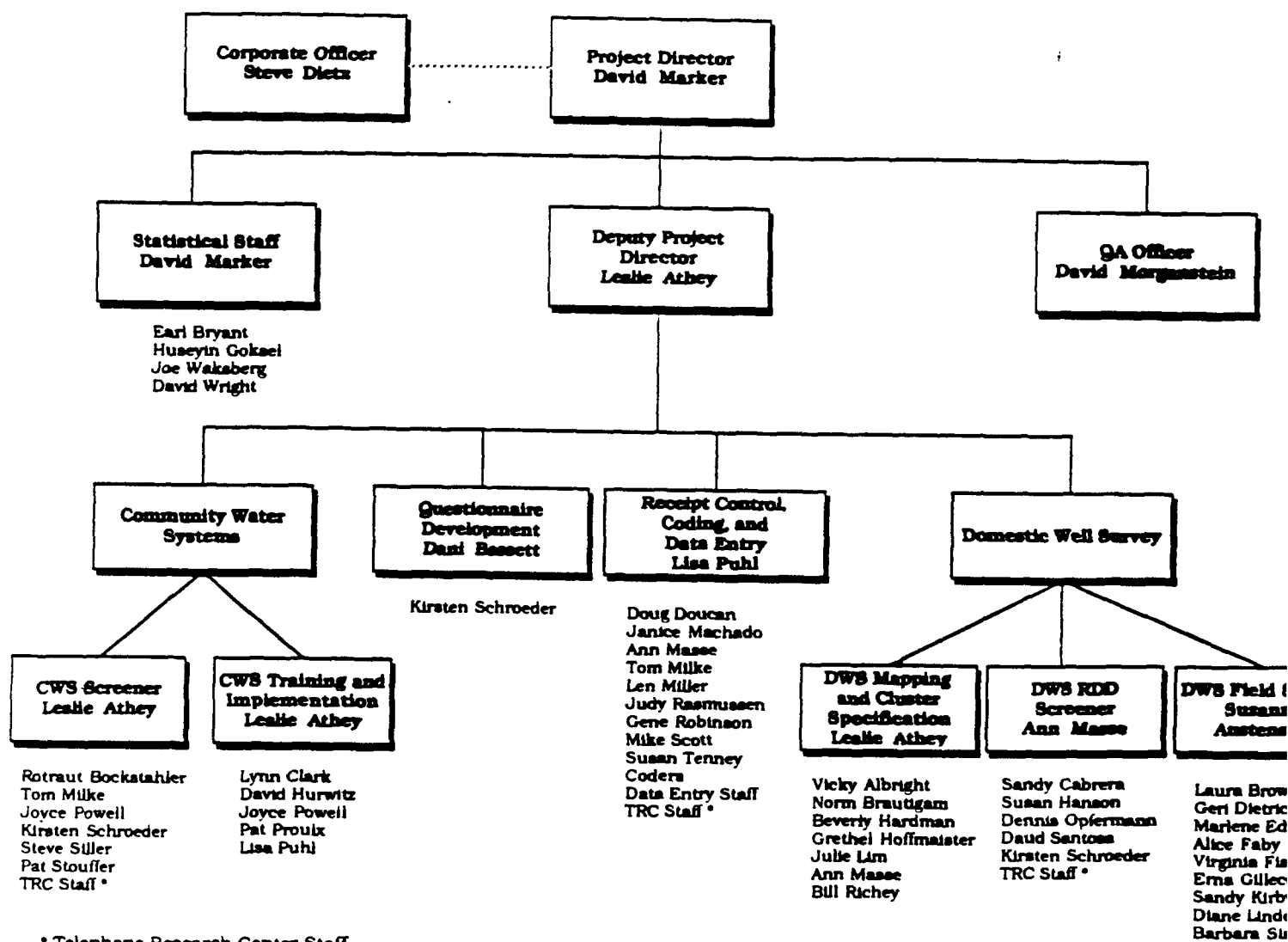
Westat's National Pesticide Survey (NPS) Project Management organization is diagrammed in Exhibit 4-1. Mr. Harold Lester is ICF's Responsible Officer-in-Charge for the NPS. Mr. David Marker is the Westat Project Director, responsible for all of Westat's activities for NPS. Mr. Marker manages Westat's staff activities. As directed by ICF, the prime contractor, Westat responsibilities include four key tasks:

- (1) Developing and implementing the statistical selection of domestic and community wells for the NPS;
- (2) Providing and supervising trained, professional interview staff for the NPS;
- (3) Developing and implementing data processing procedures for all questionnaires; and
- (4) Assisting EPA and ICF in analyzing Survey data.

Mr. David Morganstein is the Westat Quality Assurance Officer, responsible for reviewing and approving the Quality Assurance Plan. Ms. Leslie Athey and Mr. David Marker are Survey Operations Managers, responsible for Survey operations. They supervise all questionnaire development and training, interviewing, and questionnaire data processing activities. Mr. Morganstein will conduct internal audits of Westat's data processing activities. All Westat personnel can be contacted at 1650 Research Boulevard, Rockville, Maryland, 20850; or by calling (301) 251-1500.

Ms. Lora Johnson, NPS QA Officer, will conduct periodic audits of Westat's activities as part of EPA's quality assurance reviews.

Exhibit 4-1
Westat Project Management Organization



* Telephone Research Center Staff

Exhibit 4-1 (continued)
Westat Project Management Organization

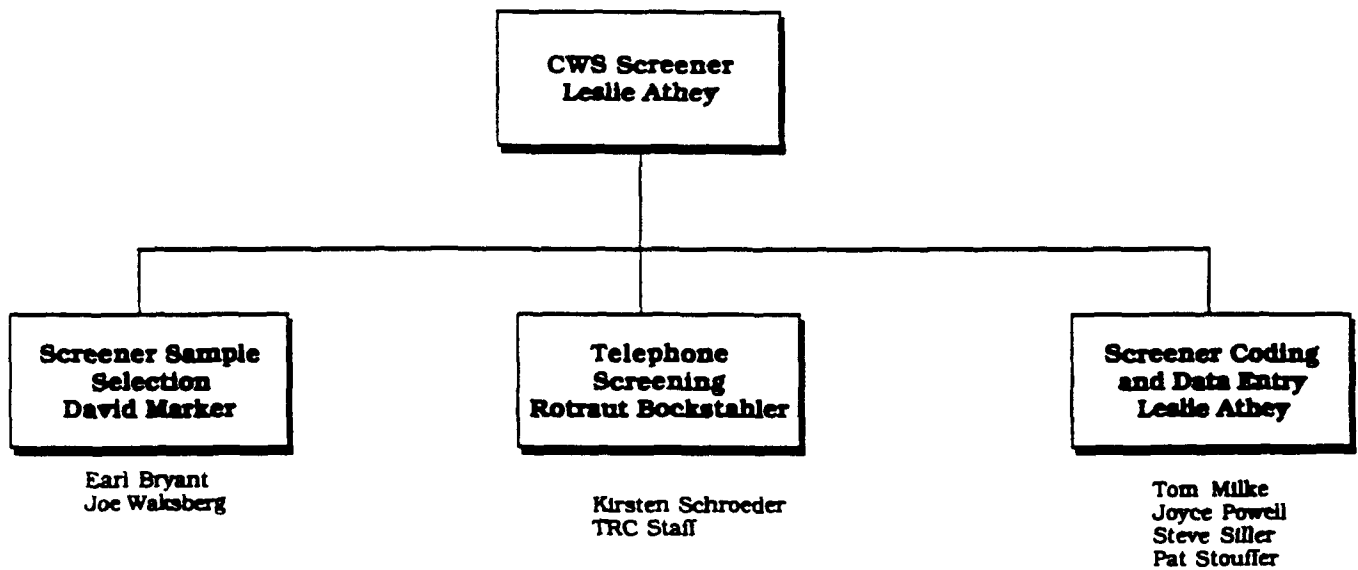


Exhibit 4-1 (continued)
Westat Project Management Organization

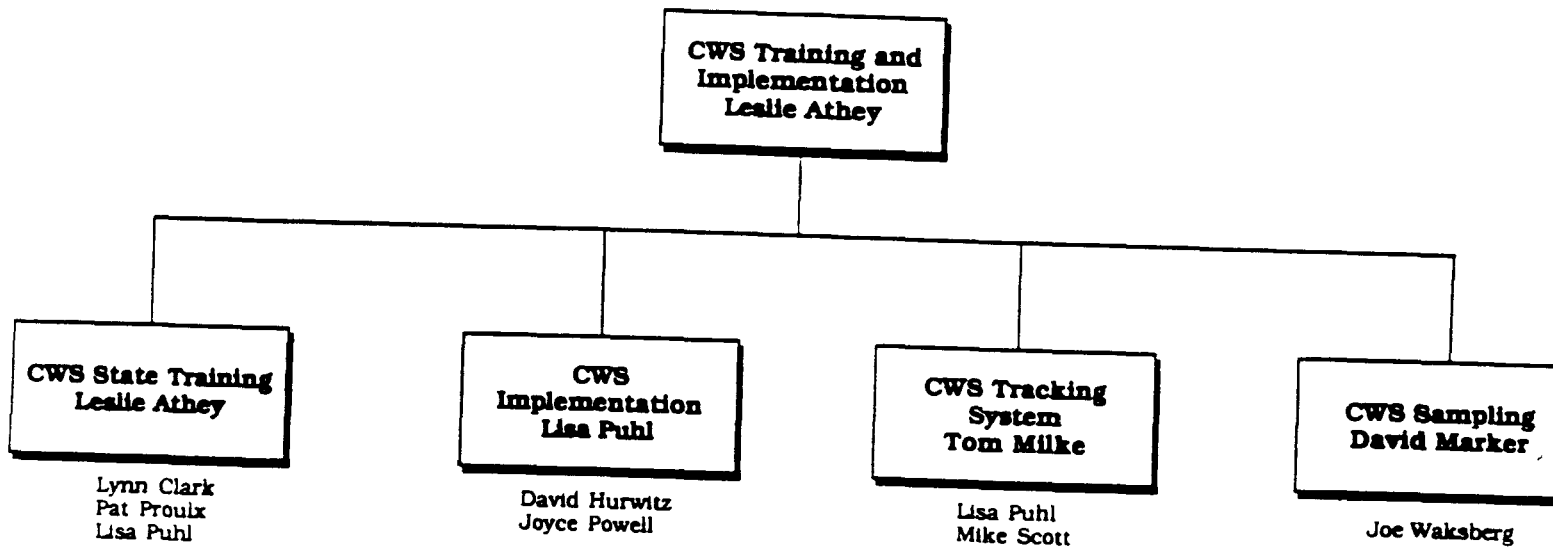


Exhibit 4-1 (continued)
Westat Project Management Organization

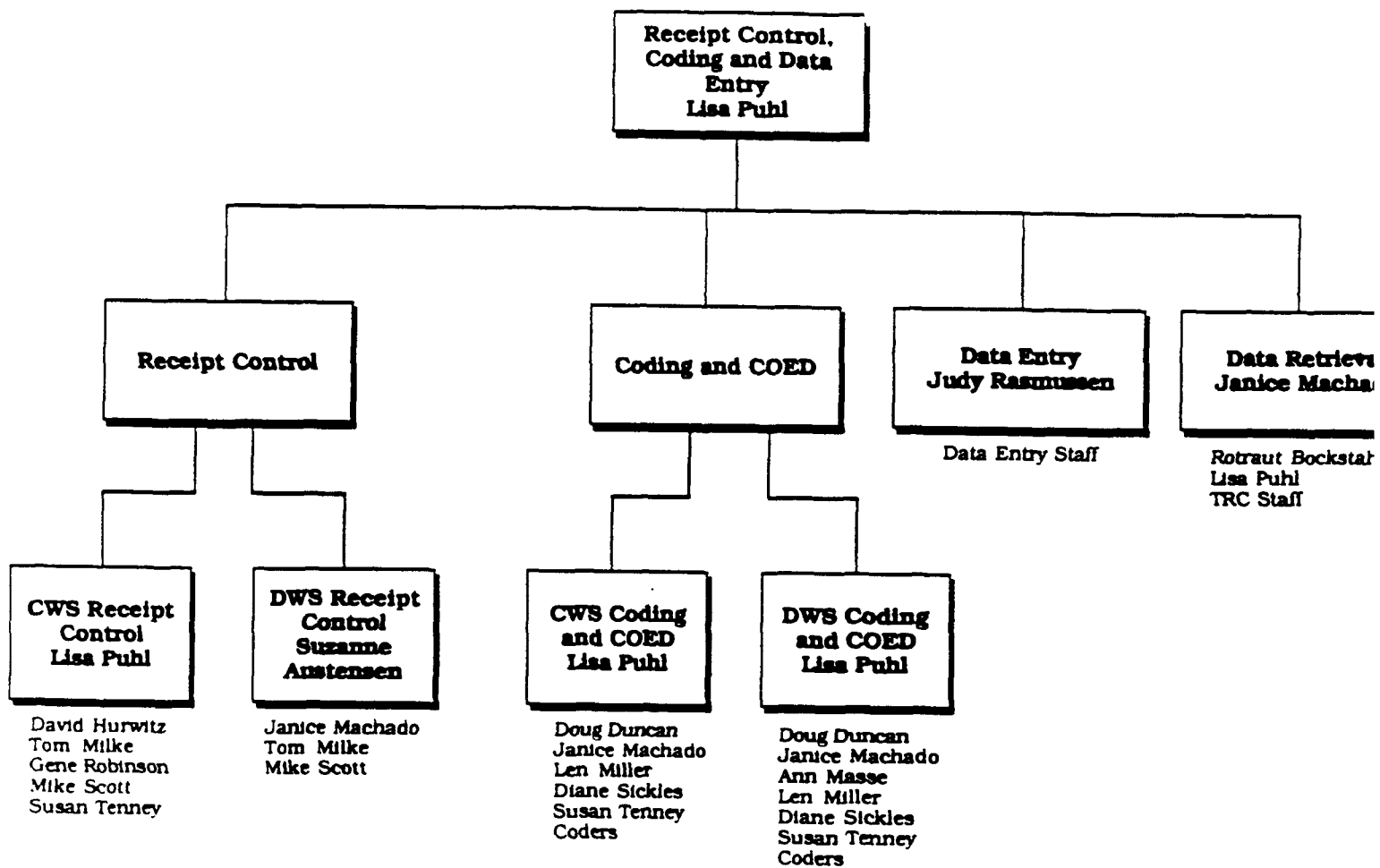


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Westat Project Management Organization

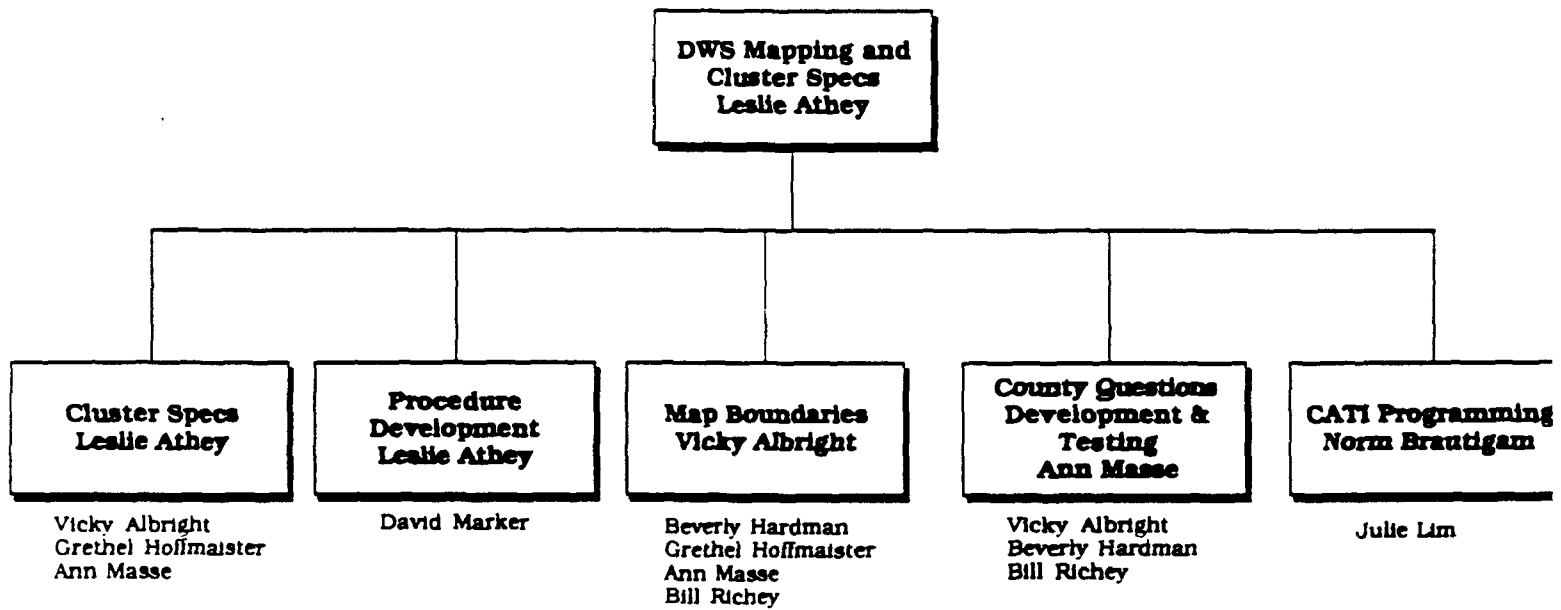
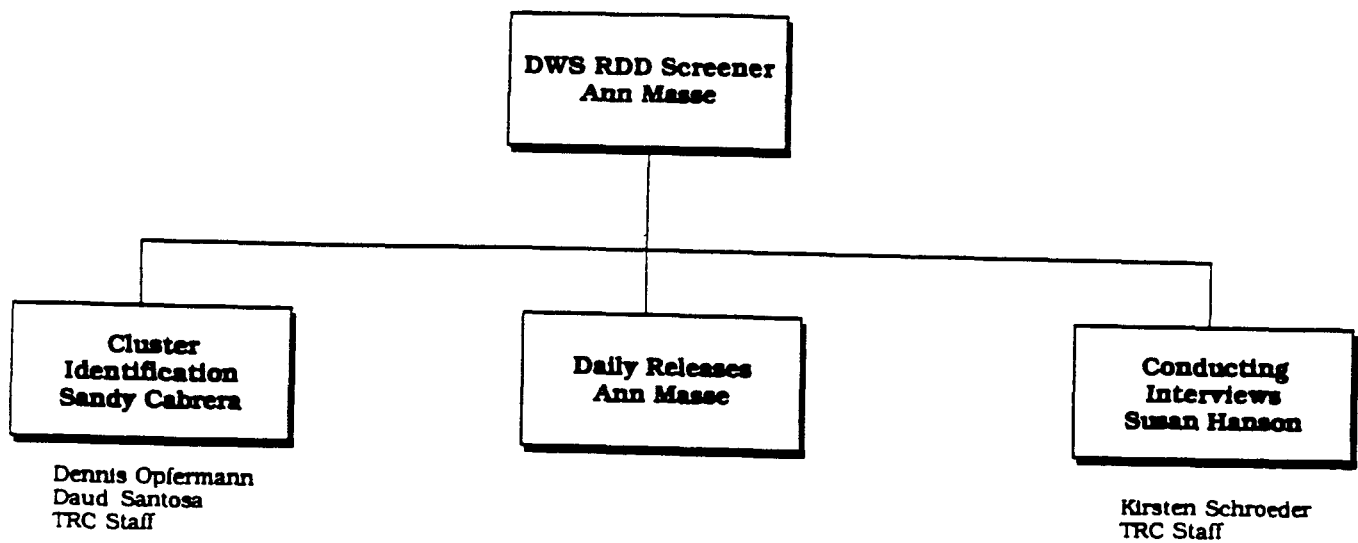


Exhibit 4-1 (continued)
Westat Project Management Organization



5. COMMUNITY WATER SYSTEM SURVEY TASKS AND QUALITY ASSURANCE PROCEDURES

5.1 Community Water System Screening Survey

The purpose of the Community Water System (CWS) Screening Survey is to determine the eligibility of CWSs for the field Survey. Eligibility for the field Survey requires that a CWS:

- Serve piped drinking water;
- Serve 25 or more permanent residents and/or have 15 or more connections; and
- Have at least one working well used for drinking.

The CWS Screening Survey is performed in five discrete steps as outlined below: Sample Selection, Questionnaire Preparation, Questionnaire Administration, Data Preparation, and Selection of Field Sample.

5.1.1 Sample Selection

The objective of sample selection for the screening Survey is to identify a national sample of CWSs that meet the selection criteria for eligibility outlined above with a small probability of error. EPA provided Westat with the CWS Screening Survey sampling plan. Westat will be responsible for reviewing and implementing the plan.

5.1.1.1 Summary of Procedures

The sample frame for the CWS Screening Survey is the Federal Reporting Data System (FRDS), maintained by Planning Research Corporation. First, EPA identified in FRDS over 50,000 CWSs using groundwater as a source of drinking water. Using this listing, EPA stratified the CWSs by pesticide usage (i.e., high, moderate, low and uncommon) and ground-water vulnerability (i.e., high, moderate, and low) of the county in which each CWS is located. A sample of 7,000 CWSs from the FRDS will be randomly selected for the CWS Screening Survey with oversampling of those CWSs that are in the high ground-water vulnerability stratum. A subsample of approximately 600 CWSs will then be randomly selected from the eligible CWSs identified out of the 7,000 for participation in the drinking water sampling Survey. (The CWS sample design is further described in the National Survey of Pesticide Residues in Community Water Systems and Rural Domestic Wells: Sample Allocation Report, Research Triangle Institute, April 6, 1988, Section 4.2.)

Exhibit 5-1 summarizes the distribution of samples across all strata and reflects the oversampling of CWSs in high ground-water vulnerability strata. The systematic random sample within each stratum for the CWS Screening Survey is selected using the respective sampling rates and starting points.

Exhibit 5-1

Distribution of Community Water System Sample Size

Stratum	Pesticide Usage	Groundwater Vulnerability	Sample Size	Universe Size	Sample Fraction	Sampling Rates	Starting Points
1	High	High	292.9	1,310	0.2236	4.47	1.01
2	High	Medium	276.7	2,669	0.1037	9.65	6.90
3	High	Low	148.4	1,432	0.1032	9.65	6.24
4	Medium	High	555.9	2,183	0.2546	3.93	3.42
5	Medium	Medium	355.3	3,352	0.1060	9.43	7.85
6	Medium	Low	265.2	2,559	0.1036	9.65	4.14
7	Low	High	867.3	3,578	0.2424	4.13	1.51
8	Low	Medium	772.0	7,199	0.1072	9.33	8.27
9	Low	Low	646.6	5,545	0.1166	8.58	0.84
10	Uncommon	High	776.2	3,472	0.2236	4.47	1.91
11	Uncommon	Medium	1,068.9	9,511	0.1124	8.90	5.58
12	Uncommon	Low	1,060.9	7,961	0.1333	7.50	3.54
Total			7,086.3	50,771	0.1396		

Using the stratified, systematic random sample method, the universe of CWSs for which groundwater is the source of drinking water is first subdivided into strata. A systematic random sample is then drawn within each stratum. In stratum 1, for instance, the sequence is 1.01, 1.01 + 4.47, 1.01 + 2x4.47, 1.01 + 3x4.47, etc. Each value is rounded up to the nearest whole number to obtain the sequence number of the respondent within the stratum. This sampling is continued until the list is exhausted.

5.1.1.2 Quality Assurance and Quality Control Procedures

The quality assurance and quality control procedures for sample selection entail reviewing the sampling plan and its implementation and automation and reviewing the automated sample selection results as follows:

- Reviewing the Sampling Plan - The Westat Project Director, an experienced sampling statistician, reviews EPA's design of sample selection procedures. It is further reviewed by the previous head of the Statistics Study Area, a Westat Senior Vice President.
- Implementing the Sampling Plan - The Westat Project Director designs step-by-step procedures to be followed in the implementation of the sampling procedures.
- Automating the Sampling Plan - The Westat Senior Systems Analyst, an experienced programmer, automates the sample selection procedures.
- Reviewing the Automated Sample Selection - Sample results of the automated programs are checked exhaustively by the Westat Project Director to confirm the accuracy of the programming.

5.1.2 Questionnaire Preparation

The objective of questionnaire preparation is to ensure that the CWS Screening Survey Questionnaire is worded and formatted such that it collects the information specified by EPA to satisfy the objectives of the CWS Screening phase of the Survey (Section 5.1).

5.1.2.1 Summary of Procedures

The original CWS Screening Survey Questionnaire design was prepared by EPA and supplied to Westat. This questionnaire had been pretested during the pilot phase of the National Pesticide Survey. Westat's role in this task will be to review and reformat the questionnaire. Specifically, this screening questionnaire is designed to collect the information required to make a determination of CWS eligibility, the number of wells, and the appropriate CWS contact.

5.1.2.2 Quality Assurance and Quality Control Procedures

The CWS Screening Survey Questionnaire will be prepared by Westat staff and reviewed by in-house experts for appropriate wording and formatting. The questionnaire will be reviewed by EPA and ICF prior to implementation.

5.1.3 Questionnaire Administration

The objective of questionnaire administration is to execute the Survey in a manner which follows established Survey protocol. The CWS Screening Survey will be administered using a paper questionnaire. The respondent for the CWS Screening Survey will be the CWS contact identified during the sample selection task 5.1.1.

5.1.3.1 Summary of Procedures

The procedure for administration of the CWS Screening Survey Questionnaire consists of phone interviewing and respondent tracking. In order to conduct the actual screening interview, the Westat interviewer will use the Respondent Information Sheet (RIS) (containing the address, phone number and other CWS owner information obtained from FRDS) and the CWS Screening Survey Questionnaire. The interviewer will call the respondent listed for the CWS and administer the CWS Screening Survey Questionnaire. The procedure for conducting the CWS screening interview is described in the interviewer training manual, which is included as Appendix A. The results of each interview will be entered into a file from which weekly progress reports will be generated. Since many of the names and phone numbers may be incorrect, incomplete or not in service, considerable effort in tracking the respondent may be required. For specific cases, tracking may include contacting Directory Assistance, or local government agencies or businesses.

5.1.3.2 Quality Assurance and Quality Control Procedures

The quality assurance and quality control goal for administering the CWS Screening Survey Questionnaire is to design and implement a Survey control system which monitors the consistency of

questionnaire administration and ensures that the Survey objectives are met. Westat will institute the following practices to ensure the quality of the CWS Screening Survey Questionnaire and its administration:

- Training interviewers - Interviewers will receive at least six hours of Survey-specific training given by the Deputy Project Director and telephone management staff. The training will include question-by-question discussion of the questionnaires and role playing. Each interviewer will be provided with a manual to assist with training and to serve as a reference during interviews.
- Conducting interviewer evaluations during training - Interviewers will be observed by the Deputy Project Director and telephone center management staff during the training role plays. Interviewers showing difficulty in understanding or administering the questionnaires will be given additional training until they demonstrate an acceptable skill level. In extreme cases, interviewers may be dismissed from the study.
- Monitoring interviewers by supervisory and project staff - Supervisors silently monitor at least five percent of the randomly selected telephone interviews. Interviewers will not know when their interviews are being monitored. Interviewers showing difficulty in understanding or administering the questionnaire will be given additional training until they demonstrate an acceptable skill level. In extreme cases, interviewers may be dismissed from the study. A copy of Westat's interviewing monitoring form is included as Exhibit 5-2.
- Providing continuous availability of experienced supervisors - Telephone supervisors will be on the interviewing floor near the interviewers during all interviewing work.
- Reviewing non-locatable cases - Supervisors will review all non-locatable cases prior to listing a final code of non-locatable to assure that all reasonable efforts have been made to contact the CWS listed on the FRDS file.
- Maintaining problem logs (by telephone supervisors) - Telephone supervisors will maintain logs of all problems encountered and conduct frequent meetings with interviewers and project staff to review problems. Corrective action strategies will be developed to minimize the reoccurrence of these problems.
- Producing weekly production reports - Weekly reports will be produced to monitor the status of the CWS screening operation. Exhibit 5-3 is a copy of Westat's Telephone Research Center Weekly Production Report. The report contains both weekly and cumulative information on interviewing hours, time per completed case, response rates, and a detailed breakdown of cases by result status.
- Reviewing 100 percent of completed questionnaires - All completed interviews will be reviewed by the original interviewers and by clerical staff. The interview supervisor will review problem interviews.
- Conducting formal debriefing of interviewers - A formal debriefing session will be held with interviewers to identify problems that were encountered while conducting interviews.

Exhibit 5-2
Monitoring Form

Date: _____

Interviewer _____ Time Began _____
Project Name _____ Time Ended _____
Project Number _____ Elapsed Time _____

Samples _____ Requests _____ Phases _____
 RDD _____ CATI _____ Main Survey _____
 List NR _____ Non-CATI _____ Pilot/Pretest _____
 Business _____

Type of Interview _____
 Screening _____ Refusal Conversion _____ Probe _____
 Questionnaire _____ Validation _____ Other _____
 Data Retrieval _____ Tracking _____

Did you monitor: _____
 Complete interview of _____
 Other than complete interview _____ Number of Calls _____

	N/A	NO PROBLEM	NEEDS ATTENTION	COMMENTS (IF PROBLEM NOTED, PROVIDE G.S. AND COMMENT)
READING AND GENERAL SKILLS				
o Identified self and reads intro clearly				
o Reads all questions verbatim				
o Reads all appropriate probes and answer categories				
o Follows SKIS and BLS instructions				
o Reads questions clearly with appropriate volume				
o Verifies spelling, address, phone numbers and other data as needed				
LISTENING SKILLS AND PROBING				
o Listens to entire answer				
o Listens for what may not be said and probes				
o Probes unclear responses				
o Remains neutral when probing				

Exhibit 5-2 (continued)

Monitoring Form

	N/A	NO PROB- LEM	NEEDS ATTEN- TION	COMMENTS (IF PROBLEM NOTED, PROVIDE Q.S. AND COMMENT)
RECORDING DATA				
o Records information accurately				
o Uses comments appropriately				
o Corrects coding errors				
o Uses control keys properly				
HANDLING REFUSALS AND QUESTIONS				
o Answers questions and objections clearly and briefly without hesitation				
o Seem confident with questioning and study				
o Offers verification number				
TELEPHONE MANNER AND RELATIONSHIP WITH RESPONDENT				
o Is pleasant and professional				
o Refrains from giving personal remarks or opinions				
o Accepts objections and sentiments without becoming personally involved				
OTHER COMMENTS:				
IF APPLICABLE:				
Discussion of case _____ ID _____ Telephone # _____				

Exhibit 5-3

Telephone Research Center Weekly Production Report

EPA - NATIONAL PESTICIDE STUDY (DRINKING WATER WELLS)
TELEPHONE RESEARCH CENTER WEEKLY PRODUCTION REPORT

WEEK #: DATE OF REPORT: FROM: TO:

HOURS SCHED	HOURS WORKED	NO SHOW HOURS	NO SHOW %	NON INT HOURS	NON INT %	INT HOURS	INT %	TOTAL CORP	HRS/ COMP	TOTAL FINAL	HRS/ FINAL
----------------	-----------------	---------------------	-----------------	---------------------	-----------------	--------------	----------	---------------	--------------	----------------	---------------

WEEKLY INFO
CUMULATIVE INFO

GOAL-TOTAL CASES IN TRC
ACHIEVED-TOTAL FINALIZED
REMAINING
ACHIEVED

RESPONSE RATE

STATUS

WEEKLY NEW CUM PERCENT

Complete (C)
Partial Complete (PC)
Out of Business (O)
Multiplicity (S1)
No CMS (S2)
Will go OOB (S3)
Final Refusal (R6)
Language Problem (LP)
Other (O)
Nonlocatable (NL)
Max Contact (MC)

TOTAL FINALIZED

Initial Refusal (2)
Tracing Needed (10)
Multiplicities (12)
Other Actives

TOTAL OTHER INTERIM

COMMENTS:.....
CASES WITH INTERIM CODES ARE
.....
NOT INCLUDED IN CALCULATION OF
.....
HOURS PER FINALIZED.
.....
.....
.....

RESPONSE RATE IS DETERMINED BY C+PC+I+S1+S2+S3/TOTAL SAMPLE excluding NON-LOCATABLES

5.1.4 Data Preparation

The objectives of data preparation are to produce a computerized questionnaire data file in a manner that minimizes errors and to provide for the physical security of the data. Data preparation consists of coding, keying, editing, data retrieval, and providing data security.

5.1.4.1 Summary of Procedures

The CWS Screening Survey questionnaire is pre-coded wherever possible to facilitate key entry. All completed questionnaires will be reviewed by a clerical staff member and then by a coder. Key entry will be performed with data entry screens using software that checks for out-of-range codes before storing the information in the database. Completed work will be secured and backed-up. Access to the data and computers is controlled and all personnel with access to this information will sign a confidentiality pledge. Back-up files are then stored and secured.

5.1.4.2 Quality Assurance and Quality Control Procedures

The quality assurance and quality control goal for data preparation is to ensure that the data are entered into a computer database and secured in a manner that will not compromise the integrity of the data. Coding, data editing, and data entry supervisors will be available when these activities are occurring to solve problem situations.

Specifically, the following procedures have been developed to ensure the accuracy and consistency of the data coding activities:

- Validating selected cases by coding supervisors - Coding supervisors will completely re-code a selected sample of cases. Validation coding will be conducted throughout the Survey. More frequent validation will be performed more in the early phases of the coding process. Coders demonstrating difficulty in understanding or completing tasks will be retrained. In extreme cases, coders may be dismissed from the Survey.
- Verifying numerical data on selected cases - The numerical data will be key-verified on at least five percent of the cases. Discrepancies between the originally keyed data and subsequently keyed data will be resolved by the data entry operator performing the verification keying. Data entry operators demonstrating difficulty in understanding or completing tasks will be retrained. In extreme cases, data entry operators may be dismissed from the Survey.
- Maintaining problem logs - Coding supervisors will maintain logs of all problems encountered and conduct frequent meetings with coders and project staff to review problems. Corrective action strategies will be developed to minimize the reoccurrence of these problems.
- Conducting frequent meetings - Frequent meetings will be conducted between coders, data entry operators, supervisors, and project staff to ensure that any problem encountered is resolved quickly and that solutions are communicated to the staff readily. These meetings will be arranged on an "as needed" basis, not at regularly scheduled intervals.

In order to ensure the security of collected data, Westat will institute the following procedures:

- Limited access - The RCRA Confidential Business Information (CBI) PC processing facility will be used. The PC will be run in a lockable office with limited access by personnel.
- Physical security - All files will be backed-up and kept in a separate storage area.
- Create permanent archive - When data are published, the raw data, methodology and procedures will be archived at ICF in order to ensure that the published results are reproducible.

5.1.5 Selection of Field Sample

The objective of the selection of the field sample is to select a sample of CWSs that meet the eligibility criteria with a small probability of error and represent CWS wells throughout the US. Westat is responsible for developing, reviewing, and implementing the CWS well selection sampling plan and delivering the eligible CWS sample to ICF.

5.1.5.1 Summary of Procedures

The CWS Screening Survey will produce a frame from which to select the CWS field sample. From the 7,000 CWSs to be screened a stratified sample of roughly 600 eligible systems will be selected. Within each stratum, the CWSs will be sorted by State and number of wells.

Exhibit 5-4 summarizes the distribution of sampling rates across strata. The starting point is a random number between 0 (rounded up to the nearest .01) and a cutoff which is defined as the total number of eligible wells divided by the sample size in that stratum.

Sample characteristics will provide the basis for developing weights during the analysis of the Survey results and provide population characteristics that will assist the analyst in imputation for missing data. This also will provide information on the quality of the FRDS database, which is the sampling frame for the Survey.

5.1.5.2 Quality Assurance and Quality Control Procedures

Westat will employ quality assurance and quality control procedures for the selection of field sample operations similar to those for CWS screening (Section 5.1.1.) as follows:

- Automating sampling procedures - A Senior Systems Analyst will prepare automated procedures.
- Programming accuracy checks - The automated program selections will be confirmed by the sampling statistician to ensure that each selected CWS was selected correctly.
- Monitoring completion rates - The Westat Project Director and ICF staff will monitor refusals and ineligible systems through the sampling period to ensure that sufficient completion rates are maintained. If completion rates are significantly below expectations it may be necessary to select supplemental samples from the eligible screened systems.

EXHIBIT 5-4

DISTRIBUTION OF SAMPLES ACROSS STRATA

Stratum	Pesticide Usage	Groundwater Vulnerability	Sample Size	Take Every
1	High	High	27	$n_1/27$
2	High	Medium	26	$n_2/26$
3	High	Low	14	$n_3/14$
4	Medium	High	45	$n_4/45$
5	Medium	Medium	32	$n_5/32$
6	Medium	Low	25	$n_6/25$
7	Low	High	73	$n_7/73$
8	Low	Medium	68	$n_8/68$
9	Low	Low	53	$n_9/53$
10	Uncommon	High	71	$n_{10}/71$
11	Uncommon	Medium	90	$n_{11}/90$
12	Uncommon	Low	75	$n_{12}/75$
			599	

Where n is the number of eligible CWSs in the stratum.

5.2 Community Water System Field Survey

The purpose of the CWS Field Survey is to collect and analyze information pertaining to the CWSs from which water samples are drawn. This information is collected through the administration of three questionnaires: the CWS Questionnaire, the CWS Team Leader Introduction and Well Observation Record, and the Local Area CWS Questionnaire. Examples of these questionnaires appear in Appendix B.

5.2.1 Questionnaire Preparation

The objective of questionnaire preparation is to ensure that the instruments used in the CWS Field Survey are worded and formatted such that they collect the information specified by EPA to satisfy the objectives of the CWS Field Survey. Specifically, the information that is gathered includes, but is not limited to, depth of the well, well construction characteristics, water treatment, depth to groundwater, general aquifer characteristics, soil texture in the immediate vicinity of the well, and pesticide usage in the vicinity of the well. Westat will modify the Survey instruments developed from the pilot phase of the NPS and incorporate EPA's and ICF's comments. Westat will review and reformat the questionnaires as necessary to minimize administration errors.

5.2.1.1 Summary of Procedures

The CWS Questionnaire and CWS Team Leader Introduction and Well Observation Record will be completed in the field at the time of well water sampling. The respondent for the CWS Team Leader Introduction and the CWS Questionnaire is the CWS representative. The CWS Team Leader Introduction will be designed to introduce the CWS representative to the Survey by presenting an overview of the Survey objectives. Its most important function will be to identify through a random selection process the specific well to be sampled in cases where the CWS is a multiple well system. The CWS Questionnaire will be designed to collect information regarding water usage, water treatment, and well construction.

The CWS Well Observation Record will be completed by EPA Region, State, or ICF field team members during well water sample collection activities. This instrument will be used by the field team to formally record information regarding soil characteristics and other significant features in the vicinity of the well.

The Local Area CWS Questionnaire will be administered to a person familiar with local conditions and usage of land and pesticides surrounding the CWS being sampled. This person will usually be the County Agricultural Extension Agent. This interview should be conducted within one week of the well water sampling activities.

5.2.1.2 Quality Assurance and Quality Control Procedures

The objectives of the quality assurance and quality control procedures for the CWS field Survey questionnaire preparation are to ensure that these instruments are unambiguous and easy to follow and that they accurately and completely collect the information requested by EPA to satisfy the objectives of the CWS Field Survey outlined above. The original CWS questionnaires were prepared and pre-tested by EPA and supplied to Westat. The questionnaires will be reworded and reformatted by Westat, and reviewed by in-house experts. The questionnaires will also be reviewed by ICF. Westat will pre-test the revised questionnaires on one case. EPA will approve the revised questionnaires before they are used in the Survey.

5.2.2 Interviewer Training

The objective of interviewer training is to provide step-by-step guidance to the interviewer throughout every phase of field Survey interview operations. Interviewer materials and Survey-specific training will provide the interviewer with in-depth training, a clear set of procedures, and complete reference documents to use in the course of the study.

5.2.2.1 Summary of Procedures

Interviewers for the CWS Field Survey will be EPA Regional and State employees, and ICF and Westat employees. All trainees will participate in a one or one and one-half day training session

specific to this study. When requested by EPA, trained Westat staff will teach Survey participants in questionnaire administration. ICF staff will train the participants to conduct well sampling activities. In specific cases when requested by EPA, trained ICF staff will conduct interviewer training. (The discussion of well sampling and ICF interviewing training is included in the Quality Assurance Project Plan for Well Sampling, Data Collection and Processing.)

The Westat Deputy Project Director and Westat Field Director will submit interviewer training materials to ICF who will prepare standardized training materials (collectively known as the "Training Manual") from which all trainees will be trained. Interviewer training will consist of lecturing on general interviewing techniques, specific review of the questionnaires and role playing. General interviewer training will instruct interviewers on how to avoid biasing the interview, complete a questionnaire, probe for additional information, maintain respondent cooperation, respond to questions about definitions, and clarify imprecise answers.

5.2.2.2 Quality Assurance and Quality Control Procedures

The objective of the quality assurance and quality control procedures for CWS field interviewer training is to ensure that interviewers are trained to collect information consistently and completely. The Westat Deputy Project Director will train all Westat trainers. During their first training they will be observed by experienced Westat staff who will provide them with feedback. The Training Manual, the standard for all CWS Field Survey interview training, will be used to conduct all interviewer training. Trainers will instruct from this standard Training Manual to ensure that the same step-by-step instructions are given to each trainee. Trainers will instruct trainees to rely on their Training Manual, rather than memory, in the event of uncertainty.

5.2.3 Materials Preparation and Mailout

The objective of Westat's materials preparation and mailout is to prepare packages of interviewing materials for each CWS sampled well (called a "case") and to send them to ICF in advance of the commencement of field activities at that CWS. Sampling schedule information will be supplied by ICF.

5.2.3.1 Summary of Procedures

Westat's Data Supervisor, Deputy Project Director, Project Programmer, and Project Systems Analyst will develop a receipt control (tracking) system to monitor the status of field Survey questionnaires. This system will be updated upon mailout, or upon receipt of information or questionnaires by receipt control clerks. Labelled cases will be sent to ICF approximately four weeks prior to the two week window during which sampling is scheduled to occur according to the sampling schedule information provided by ICF. Labels will contain the case identification number and the respondent's name, address and telephone number. Labels containing random numbers to be used in the selection of wells to be sampled will be placed inside the Team Leader Introduction

questionnaire. Bar coded labels with case identification numbers will also be attached to questionnaires. ICF will forward the interviewing materials to the sampling team along with their Field Logbook.

5.2.3.2 Quality Assurance and Quality Control Procedures

The objective of the quality assurance and quality control procedure for materials preparation and mailout is to ensure that all of the information for each case is sent to ICF in advance of the commencement of field activities according to sampling schedule information provided by ICF. The questionnaire tracking system will be developed and reviewed to ensure its integrity. Also, any manually typed information will be accompanied by a computer printout to verify keypunch accuracy. This printout will be maintained in a logbook.

5.2.4 Monitoring Field Activities and Questionnaire Receipt Control

The objectives of monitoring field activities and questionnaire receipt control are to monitor the status of interviews and to account for all questionnaires sent out into the field.

5.2.4.1 Summary of Procedures

The monitoring of field activities will be somewhat limited because the state and regional interviewers are not experienced interviewers under Westat's direct supervision. However, they will be monitored through their returned questionnaires. All returned questionnaires are reviewed for problems according to the procedures outlined in Section 5.2.5. Any detected problems that may have an impact on how survey data are collected in the future will be brought to the Westat Field Director's attention. The Field Director will then determine whether a call needs to be made to either the interviewer or field team leader. The Field Director will contact the appropriate person and discuss the problem, and explain the correct action to be taken in the future. All problems and their resolutions will be documented in the State Problem Logbook.

Questionnaires for each CWS will be delivered by Westat to ICF, where they will be packed with the water sampling supplies and sent to the state team leader. All documentation, including questionnaires and data collected during water sampling will be returned to Westat. Westat will retain the questionnaires for coding and data entry, and return the water sampling data immediately to ICF.

The computerized receipt control system will keep the following information on each case:

- The expected date of water sampling and interviewing at the CWS;
- The date on which the case is delivered to ICF;
- The date on which the case is received at Westat after sampling and interviewing;
- A code indicating the status of each finished case (completed, ineligible, etc.); and
- The date on which the water sampling data are delivered to ICF.

Information sent by ICF on the expected date of water sampling and interviewing will be received by Westat and entered into the receipt control system as described in Section 5.2.3.1. Interviewing packages including questionnaires will be delivered to ICF in three large shipments. Each questionnaire will be logged out of the system by a Receipt Control Clerk using a light pen to scan the bar code label on each questionnaire. Both the date and case identification number will be entered into the system. Returned questionnaires will be logged into Westat's system by scanning the bar code label. Water sampling data books will be logged out of the system when they are sent to ICF.

The receipt control system will use the above information to produce reports that will assist the Field Director in accounting for the survey questionnaires. Three reports will be reviewed regularly to determine the status of the questionnaires in the field, to indicate when a repeat visit well case needs to have a well selected, and to indicate the eligibility of those cases returned from the field.

The Overdue Case Report will indicate which cases are overdue from the field by three weeks or more. Westat will contact the responsible field team leader for an explanation of why the questionnaire is overdue. These conversations will be documented in the State Problem Logbook. A copy of the Overdue Case Report shell is shown in Exhibit 5-5.

The Repeat Visit Well Report will indicate those CWSs that have more than one well to be sampled and that need to have a well randomly selected for an upcoming visit. The field Director will select for the field team the next well to be sampled using the list of wells collected during the previous interview. This helps prevent the same well from being sampled more than once and adds another measure of quality control to the well selection procedure. A copy of the Repeat Visit Well Report shell is shown in Exhibit 5-6.

The Problem Report will indicate which cases are ineligible, refusals, mismatches (cases sampled outside of the designated sampling period), and other problems such as updated respondent identification information, and interviewing problems such as the use of an inappropriate respondent. A copy of the Problem Report shell is shown in Exhibit 5-7.

5.2.4.2 Quality Assurance and Quality Control Procedures

The objectives of the quality assurance and quality control procedures for monitoring field activities and questionnaire receipt control are to ensure that the mail-out, interviewing, and return of questionnaires are performed according to the guidelines specified in Section 5.2.4.1.

All interviewer monitoring problem cases will be documented in a State Problem Log. The documentation will describe the problem and the action taken to correct it. The field director will discuss any new or unusual problems with the Deputy Project Director or Project Director to ensure that correct and consistent interviewing instructions are given to the interviewers.

Exhibit 5-5
Overdue Case Report

OVERDUE CASE REPORT						REPORT DATE		
WELLID-----	CWSID---	CWSNAME-----	WK2A-----	WK2-----	CONFIRMED DATE	TLI RECEIVED	CO RECEIVED	L
1					/ /	/ /	/ /	
2					/ /	/ /	/ /	
3					/ /	/ /	/ /	
4					/ /	/ /	/ /	
5					/ /	/ /	/ /	
6					/ /	/ /	/ /	
7					/ /	/ /	/ /	
8					/ /	/ /	/ /	
9					/ /	/ /	/ /	
10					/ /	/ /	/ /	
11					/ /	/ /	/ /	
12					/ /	/ /	/ /	
13					/ /	/ /	/ /	
14					/ /	/ /	/ /	
15					/ /	/ /	/ /	
16					/ /	/ /	/ /	
17					/ /	/ /	/ /	
18					/ /	/ /	/ /	
19					/ /	/ /	/ /	
20					/ /	/ /	/ /	
21					/ /	/ /	/ /	
22					/ /	/ /	/ /	
23					/ /	/ /	/ /	
24					/ /	/ /	/ /	

Exhibit 5-6
Repeat Visit Report

CWS REPEAT VISIT REPORT

REPORT DATE:

WELLID-----	CWSID----	CWSNAME-----	RAND1	RAND2	RANDOM NUMBERS		RAND5	RAND6	PRESELECTED			RV1	RV2	RV3	N_WELLS	TIRCD---	DUE DATE-	INELIGIBLE
					RAND3	RAND4			RV4	RV5	RV6							

As discussed in Section 5.2.3.2 the tracking system includes checks to ensure its integrity, such as bar coding to eliminate keypunch errors. In addition to the quality checks already mentioned in the procedures section, the Overdue Case, Repeat Visit, and Problem Reports will be periodically cross-checked against ICF's records to ensure their accuracy and completeness.

Westat will also conduct field audits of CWS interviews to observe the implementation of questionnaire administration by state personnel. Actual procedures used by the field team will be compared with that taught in the state training session. A report on these audits will be given to the NPS Quality Assurance Officer, EPA, and ICF.

5.2.5 Initial Editing and Initial Data Retrieval

The objective of the initial editing and data retrieval phase is to identify those Team Leader Introduction questionnaires with significant interviewing errors, specifically, cases where the identity of the sampled well is unclear, and to retrieve this missing information from the field team leader.

5.2.5.1 Summary of Procedures

Initial editing will be performed as soon as possible after receipt of the questionnaires in order to identify the well before the team leader forgets which well was sampled. Data retrieval staff will telephone the team leaders to obtain the missing information and will document these calls in the State Problem Logbook.

5.2.5.2 Quality Assurance and Quality Control Procedures

The quality assurance and quality control objective for initial editing and initial data retrieval is to ensure that any critical interviewer error, especially ones concerning the identity of the well that was sampled are identified and corrected. The bar coded questionnaires will be processed upon receipt so that interviewers, or if necessary respondents, can be contacted promptly for data retrieval. In the event that an interviewer has not recorded information properly, retraining will be conducted during the data retrieval telephone call to reduce the probability of future errors of the same type. A record of all problems of this type will be kept in the State Problem Logbook.

5.2.6 Data Preparation and Data Entry

The objective of data preparation and data entry is to create a data file containing the data from the returned questionnaires. A separate file will be created for each of the three types of questionnaires. This is necessary before the information can be properly stored and analyzed.

5.2.6.1 Summary of Procedures

Data preparation and data entry will consist of four steps:

- Coding, which will be a review of questionnaires to resolve any ambiguous responses and prepare the forms for keypunching;
- Data entry, or keypunching of the data;

- Editing, which will involve running the keyed data through a set of computerized skip pattern, range, and logic checks; and
- Data retrieval, where missing information on items designated as key by EPA is obtained from the CWS by telephone.

Westat will use a coding and data editing system called COED from which a coding manual will be generated. Coded questionnaires will then be key entered into the appropriate database. The COED system will also identify data that fail range, logic, and skip checks.

5.2.6.2 Quality Assurance and Quality Control Procedures

The objective of the quality assurance and quality control procedures for data preparation and data entry is to ensure that data is entered accurately. This objective will be achieved through the following procedures:

- Training - All coders will be trained by the Coding Supervisor. They will be provided with coding manuals for their reference. Data retrieval interviewers will be trained by the Data Retrieval Supervisor. They will also be provided with manuals for their reference.
- Validating selected cases in coding - The Coding Supervisor will validate 100% of each coder's work until the supervisor determines that the coder has fully grasped the procedures, after which at least two percent of the coder's work will be validated.
- Maintaining coding "Problem Logs" - The Coding Supervisor will maintain a log of problems encountered by coders during the coding process. This log will be maintained in the coding area and will be immediately available for each coder's reference. Corrective action strategies will be developed to minimize the reoccurrence of these problems. Each coder will be briefed on any decisions that affect coding procedures.
- Meeting regularly to discuss problems - At least weekly meetings will be arranged between the Coding Supervisor and the coders to discuss new coding conventions, problems, and anything else that impacts the coding process. In addition, the Coding Supervisor will talk at least weekly with the Data Preparation Supervisor to discuss new conventions, problems, staffing, and scheduling. These meetings will uncover potential coding problems and provide for their immediate resolution.
- Editing and QA/QC via the COED program - The COED edit program will identify unacceptable values, missed or inaccurate skip patterns, and simple logical inconsistencies.
- Monitoring of Data Retrieval Interviews - Data retrieval interviewers will be monitored by the Data Retrieval Supervisor until she is satisfied with their work.

Quality assurance for data entry is achieved by independently double-keying all information to ensure that it is entered accurately. The second person keying the information is the Verifier and is responsible for correcting keying errors. Data entry programs are written and checked by the Data Entry Supervisor.

5.2.7 Data Analysis and Reporting

The objectives of data analysis and reporting are to summarize well construction characteristics, well water treatment, farming practices, pesticide usage, and soil textures in the vicinity of the well, and other information collected during the CWS Field Survey. This information will be merged with the well water chemical analyses to determine how pesticide usage is related to ground-water vulnerability.

5.2.7.1 Summary of Procedures

Missing data frequencies will be reviewed for each questionnaire and the chemical analytes. Data may be missing due to refusals to participate, chemical analysis quality failures, nonresponse to a particular questionnaire item, or respondent data failing edit, range, or logic checks. Imputation procedures will be developed for item missing data and weighting will adjust for unit-level nonresponse. Weighting will also adjust for the unequal probabilities of selection for different wells included in the survey.

Population estimates and confidence intervals will be calculated for chemical analyses and many questionnaire items. Multivariate analytic techniques will be used to examine potential relationships among the variables. The procedures used for imputation, weighting, and the calculation of population estimates and confidence intervals will be described in detail in Appendix B of the National Pesticide Survey Phase I Report. Relational analyses will be described in the NPS Phase II Report.

5.2.7.2 Quality Assurance and Quality Control Procedures

The objectives of the quality assurance and quality control procedures for data reduction, analysis, and reporting will be to ensure that the data are manipulated and analyzed accurately and reported clearly. The data will be used in such a manner as to satisfy the objectives of the overall Survey by illuminating the relationship between pesticide usage, ground-water vulnerability, and pesticide contamination of drinking water wells. Among the procedures for evaluating the quality of the questionnaire data will be the following:

- Review the "Not Answered" and "Don't Know" rates for individual questions. When combined with feedback from QA audits conducted by the Westat Project Director and NPS QA Officer this will provide information on the relative utility of responses; and
- "Not Answered" and "Don't Know" rates from the CWS will be compared with those found from similar questions on the DWS Questionnaire. Differences will reflect both the relative level of knowledge of CWS owner/operators and well owners, as well as the impact of using professional, experienced interviewers for the domestic well Survey.

Among the procedures to be used to assure the quality of the imputation, weighting, estimation, confidence intervals, and relational analyses are the following:

- Alternative imputation procedures will be discussed with Westat, ICF, and EPA personnel. Westat statistical staff will make recommendations on the most appropriate

procedures to use. These will then be reviewed by ICF and EPA personnel before implementation.

- After imputation is completed all data will again be passed through edit, range, and logic checks to ensure the quality of the final data sets. Any imputed data that fail such checks will be examined and re-imputed if necessary.
- The weights must reflect the multiple-stage selection procedure. The distribution of the weights will be reviewed for each stage in the process by Westat's senior statistical staff to ensure the accuracy of the programming and to determine if any individual weight is so large as to be adversely impacting the accuracy of the estimates by inflating the standard errors. If such a situation arises statisticians will examine the possibility of weight trimming to reduce the overall mean square error of the estimates.
- Population estimates and confidence intervals will be reviewed by Westat's statistical staff for consistency. The estimated standard errors will be reviewed to determine if the implied design effects are within expected levels for such a survey design. Confidence intervals based upon normal approximations will only be used for those estimates for which such an assumption will not lead to negative confidence limits.
- The potential for temporal effects on chemical results will be examined for those analytes with a large enough number of contaminated wells. This examination will be conducted both with and without sampling weights.

5.2.8 Systems Security and Data Backup and Archival

The objective of systems security and data backup and archival is to establish and maintain a system for the ongoing protection of data.

5.2.8.1 Summary of Procedures

The system and procedures for systems protection and data backup and archival for the NPS will be the same as those standard for all large-scale Westat data collection efforts. In order to ensure the security of collected data, Westat will institute the following procedures:

- Limit the access to the computer room - Access to the Westat computer room will be restricted to authorized computer operations personnel.
- Secure the VAX/VMS - The VAX/VMS operating system will be password protected to prevent unauthorized access to the system and all sensitive disk and tape files.
- Backup files - The Master files and all transaction files will be maintained on the Westat Gaither Microvax cluster with copies of all major components stored off-site at a commercial tape storage facility. In order to prevent loss of data due to user error or hardware failure, the computer facility will back-up user files to magnetic tape daily. Each day's back-up tapes will be retained for more than two months. Lost files can be recovered within an hour.
- Physically Secure the computer facilities - All computer facilities will be temperature- and humidity-controlled, protected against fire, power surges, overheating, and flooding and will be served by a battery-based uninterruptible power system.

- Archive Periodically - Once a month a full set of back-up tapes containing all user data will be archived and retained for one full year. Westat uses a remote computer security facility to store copies of back-up tapes and back-up disk pack media. Data and analytical results produced as part of the NPS will be archived at significant program milestones. These milestones include:
 - Completion of Data Editing;
 - Completion of Data Analysis; and
 - Completion of Final Report.
- Create Permanent Archive - When data are published, the raw data, methodology, and procedures will be archived at ICF in order to ensure that the published results are reproducible.

5.2.8.2 Quality Assurance and Quality Control Procedures

Inherent in the systems security and data backup and archival procedures are the quality assurance and quality control procedures. Written logs are kept of all back-up activities. The above procedures are standard Westat practices incorporated into large-scale data collection activities.

6. DOMESTIC WELL SURVEY TASKS AND QUALITY ASSURANCE PROCEDURES

The objectives of the Domestic Well Survey (DWS) are to identify a nationally representative sample of domestic wells, to estimate their frequency and levels of pesticide contamination, and to gather information needed to relate groundwater vulnerability and pesticide usage associated with these wells. This information will be gathered through the five questionnaires listed below:

- County Agent Questionnaire;
- Domestic Well Survey Screening Questionnaire;
- Domestic Well Questionnaire;
- Domestic Well Team Leader Introduction and Well Observation Record; and
- Domestic Well Local Area Expert Questionnaire.

EPA has no comprehensive listing of domestic water wells which serves as a sampling frame. Therefore, the Agency used a sampling methodology to randomly select domestic water wells with an emphasis on geographic areas that have high pesticide usage and ground-water vulnerability. EPA stratified the more than 3,000 counties in the United States by an indicator of pesticide usage and ground-water vulnerability (known as First-Stage Stratification) (see Exhibit 6-1) and then randomly selected 90 counties, oversampling counties that are in the stratum of high pesticide usage and/or high ground-water vulnerability. This process created the First-Stage Sample.

Exhibit 6-1

Stratum	Pesticide Use	Groundwater Vulnerability
1	High	High
2	High	Medium
3	High	Low
4	Medium	High
5	Medium	Medium
6	Medium	Low
7	Low	High
8	Low	Medium
9	Low	Low
10	Uncommon	High
11	Uncommon	Medium
12	Uncommon	Low

ICF is responsible for subdividing each of the 90 selected counties into areas of high ground-water vulnerability and cropping (known as Second-Stage Stratification). This stratification is based on information collected through in-person interviews with local county agricultural cooperative extension agents (i.e. administration of the County Agent Questionnaire).

Westat will conduct a Random Digit Dial (RDD) screening interview of households in each of 84 counties (wells were previously identified in six counties as part of the NPS Pilot Survey). The screening interview will be used to select a sample of households (known as Third-Stage sample) that have a drinking water well and are eligible for the full scale Survey. After selecting a sample of households, a field team consisting of an ICF Team Leader and a Westat interviewer will visit the household. The Team Leader will collect well water samples and complete the Well Observation Record. The Well Observation Record will be used to record information about the well and the surrounding area. The Westat interviewer will administer the DWS Questionnaire to homeowners and residents to gather information on the use of the well water and the construction of the well. To obtain information on the land use of the area surrounding the wells being sampled (e.g., presence of landfills, wastewater treatment facilities, farming, etc.), the Westat interviewer will also conduct an interview with a local area expert (e.g., the County Agricultural Cooperative Extension Agent).

6.1 Second-Stage County Agent Interview

The primary objective of the County Agent Questionnaire is to gather cropping and pesticide usage information for each of the counties in the DWS Field Survey. This information will be used to determine the oversampling areas ("cropped and vulnerable") within each of the selected counties.

6.1.1 Summary of Procedures

The County Agent Questionnaire will be administered as an in-person interview with the County Agricultural Cooperative Extension Agent. The information obtained with the County Agent Questionnaire will be used to establish the "Cropping Category" for the areas in each United States Geological Survey (USGS) quadrangle map in each of the selected counties. The Cropping Category will be defined by the percent of land area farmed (i.e. more than 50%, 25 to 50% or 0 to 25%) and the pesticide usage (i.e. higher, lower or about the same) in each quadrangle relative to the rest of the county. This cropping information will be overlaid with the hydrogeologic ground-water vulnerability information (i.e. DRASTIC scores) for each county to define the areas for oversampling. The resulting *Second-Stage County Cropped and Vulnerable Maps* will be used for oversampling during the DWS Screening Survey (Section 6.2.) performed by Westat. (These mapping activities are described in further detail in the Appendix A of the Quality Assurance Project Plan for Hydrogeologic Characterization and Second-Stage Stratification Activities.)

All County Agent Questionnaires will be administered by four ICF staff members. These interviewers will receive interviewer training specific to the County Agent Questionnaire. A Question-by-Question Specification Manual will be prepared to ensure that the interviewers administer the questionnaires consistently. (The County Agent Questionnaire administration activities are described in further detail in Appendix B of the Quality Assurance Project Plan for Hydrogeologic Characterization and Second-Stage Stratification Activities.)

Westat will review the County Agent Questionnaire to ensure that the language and format of the questionnaire is consistent across all interviews and conforms to appropriate questionnaire design. Westat will review the questionnaire to reduce ambiguity and response errors.

The completed County Agent Questionnaires will be reviewed by other project staff when they are returned from the field at which point initial data editing and data retrieval will be conducted.

6.2 DWS Screening Survey

The objective of the DWS Screening Survey is to identify in each county a sample of eligible households possessing drinking water wells. The number of sampled eligible households in each county will vary according to the stratum designation.

6.2.1 Questionnaire Preparation

The objective of questionnaire preparation is to produce a questionnaire that collects the information specified by EPA. The DWS Screening Questionnaire will be a Computer Assisted Telephone-Interview (CATI) and will be used to identify and select households eligible for DWS sampling and data collection.

6.2.1.1 Summary of Procedures

Westat will develop the DWS Screening Questionnaire by reviewing and reformatting the questionnaire. The DWS Screening Questionnaire will be administered as a CATI questionnaire which contains approximately 30 questions. Westat will program the questionnaire for CATI and train telephone interviewers to administer the screening questionnaire. All responses obtained from the screening Survey are entered into a database by the program. Data range and skip pattern checks are performed during the interview.

6.2.1.2 Quality Assurance and Quality Control Procedures

Westat's quality assurance and quality control goals for the DWS Screening Questionnaire are to ensure that the information obtained is consistent across all interviews and to determine if the eligible well is in a "cropped and vulnerable" portion of the county according to information provided by ICF. The quality assurance and quality control procedures also ensure that the questionnaire collects the information from the respondent needed to determine domestic well eligibility according to criteria established by the EPA. These goals will be achieved through extensive in-house reviews of the

questionnaire by experienced Westat staff. The questionnaire will be reviewed by ICF and EPA prior to its use.

6.2.2 Preparation of County-specific Questions

The objective of developing county-specific questions is to produce a list of questions specific to each county which will be needed to identify the sample of households for which to administer the DWS Screening Survey. This will be accomplished by identifying rural areas of each of the selected counties in which to conduct the DWS Screening Survey, and "cropped and vulnerable" regions to be oversampled. For this Survey, EPA is not interested in urban regions of counties and these regions must therefore be identified and eliminated from potential inclusion in the Survey.

6.2.2.1 Summary of Procedures

Preparing county-specific questions has three major steps: cluster specifications; map preparation; and developing, programming, and testing the questions. Cluster specification staff develop county specifications according to the procedures described in the series of memos included as Appendix C. An example of a Domestic Well Screening Survey Cluster Identification form is shown as Exhibit 6-2. Most of the codes on this form are described in the initial document in Appendix C. The group number refers to a Westat internal grouping of the counties into sets of size four. Adjusted C1 is the initial number of clusters, adjusted for percent urban. C2 is the number of clusters initially sent to the telephone center and is an adjustment to ensure that the numbers of clusters exceeds the desired number of completes and thereby reduce the number of completes per cluster.

$C2 = \text{maximum}\{\text{adj } C1, nx1.25\}$ (for early counties, before adjustments were made for urbanicity,
 $C2 = \text{maximum}\{C1, nx1.25\}$). C3 is the larger number of clusters to be identified to provide a source of reserve clusters if needed. This form is sent to the Cluster Identification Supervisor for selection of clusters.

Mapping staff will begin by collecting local county maps for each upcoming county. They will use these local county maps to draw urban areas and major landmarks onto the Second-Stage County Cropped and Vulnerable Maps provided by ICF. The maps provided by ICF will already indicate the target areas to be oversampled. Mapping staff will also check the zip code boundaries on the Second-Stage County Cropped and Vulnerable Maps against those on a Rand McNally Zip Code Atlas. (For some counties, the second-stage maps will not include zip code boundaries, in these cases boundaries will be drawn from the Rand McNally atlas.) Discrepancies in zip code boundaries will be resolved by contacting the local county post office. Since EPA is not interested in urban regions for this study, a list of known urban areas to be excluded from each county will be prepared from Census Bureau data.

Exhibit 6-2
Domestic Well Screening Survey Cluster Identification Form

DOMESTIC WELL SCREENING SURVEY

Date: 9 / 13 / 8

CLUSTER IDENTIFICATION

n = target number of households
p = percent of households in county with wells
t = percent of households in oversampled area
v = percent of households only in the nonoversampled area
r = response rate
s = size of screening sample*
c1 = number of clusters generated from equation
c2 = adjusted number of clusters for cluster spec*
c3 = adjusted number of clusters for additional cluster id*
n(cluster) = number of phone numbers per cluster*

Prefixes in the non-oversampled area? Y/N

If yes, list: _____

Prefixes in urban areas? Y/N

If yes, exclude: 309382 _____
309383 _____
309655 _____
309671 _____
309672 _____
309698 _____

*Note: s, c2, and n(cluster) are the cluster ID specs

Screening begins: 11, 06, 89
Screening ends: 11, 29, 89

STRATUM ID#	COUNTY NAME	GROUP STATE	#	n	p	t	v	r	s*	c1	c2	c3	n(cluster)
03	Peoria	IL	19	14	0.51	0.90	0.15	0.75	35.69	12.19	0.22	55.97	55.97 83.96

Mapping staff make the initial draft questions to determine if a household is located within the "city limits" of an urban area to be excluded. For example, "Do you live within the city limits of Richmond?" If the boundary of the urbanized area is unclear, this boundary will be overestimated to adjust for probable growth since the 1980 census. Once all urban and urbanized regions in the county have been excluded, the zip codes in the remaining "target areas" will be compiled and the physical boundaries of the target area will be defined by using landmarks (i.e. rivers, mountains, highways, etc.). These landmarks will then be used in a series of questions to determine well location relative to the target area. Final decisions on "smoothing" the boundaries will be made by the DWS Mapping and Cluster Specification Supervisor (see Appendix D for additional details). After approval, the county-specific questions are submitted for CATI programming and testing. The County Questions Development Supervisor will log onto the VAX to test the program using multiple mock interviews.

6.2.2.2 Quality Assurance and Quality Control Procedures

The objective of the quality assurance and quality control procedures for preparing county-specific questions is to ensure that zip code boundaries and urban regions are accurately identified and that these identifications are made consistently across all counties. In order to ensure the accuracy of these procedures, the mapping staff will be trained specifically for performing the research to confirm zip code boundaries and city limits for the Second-Stage County Cropped and Vulnerable Maps. To ensure the consistency of these identifications across all counties, all final decisions regarding the smoothing of boundaries will be made by the DWS Mapping and Cluster Specification Supervisor. Specific procedures for quality assurance include:

- Reviewing (by the ICF Project Director) the overall procedure for determining clusters (the first letter included in Appendix C);
- Reviewing (by the Cluster Specifications Supervisor and Project Director) the Domestic Well Screening Survey Cluster Identification Form for each county;
- Maintaining a control chart on county-by-county completion rates in the telephone research center (Exhibit 6-3). This chart will be reviewed by the Westat Project Director; if the chart indicates the need for modifying cluster specification procedures the Project Manager will institute such corrective action;
- Preparing a Zip Code Check List for each county (Exhibit 6-4) that will be used to document all zip codes identified by the telephone center, ICF, or the Rand McNally Zip Code Atlas. This check list will identify whether a zip code includes the target area and what percent of it is in an urban area. This form will be reviewed by the Mapping Supervisor;
- Reviewing (by the County Questions Development Supervisor) county-specific questions; and
- Testing (by the County Questions Development Supervisor) the CATI programming.

Exhibit 6-3
Control Chart for Attribute Data.

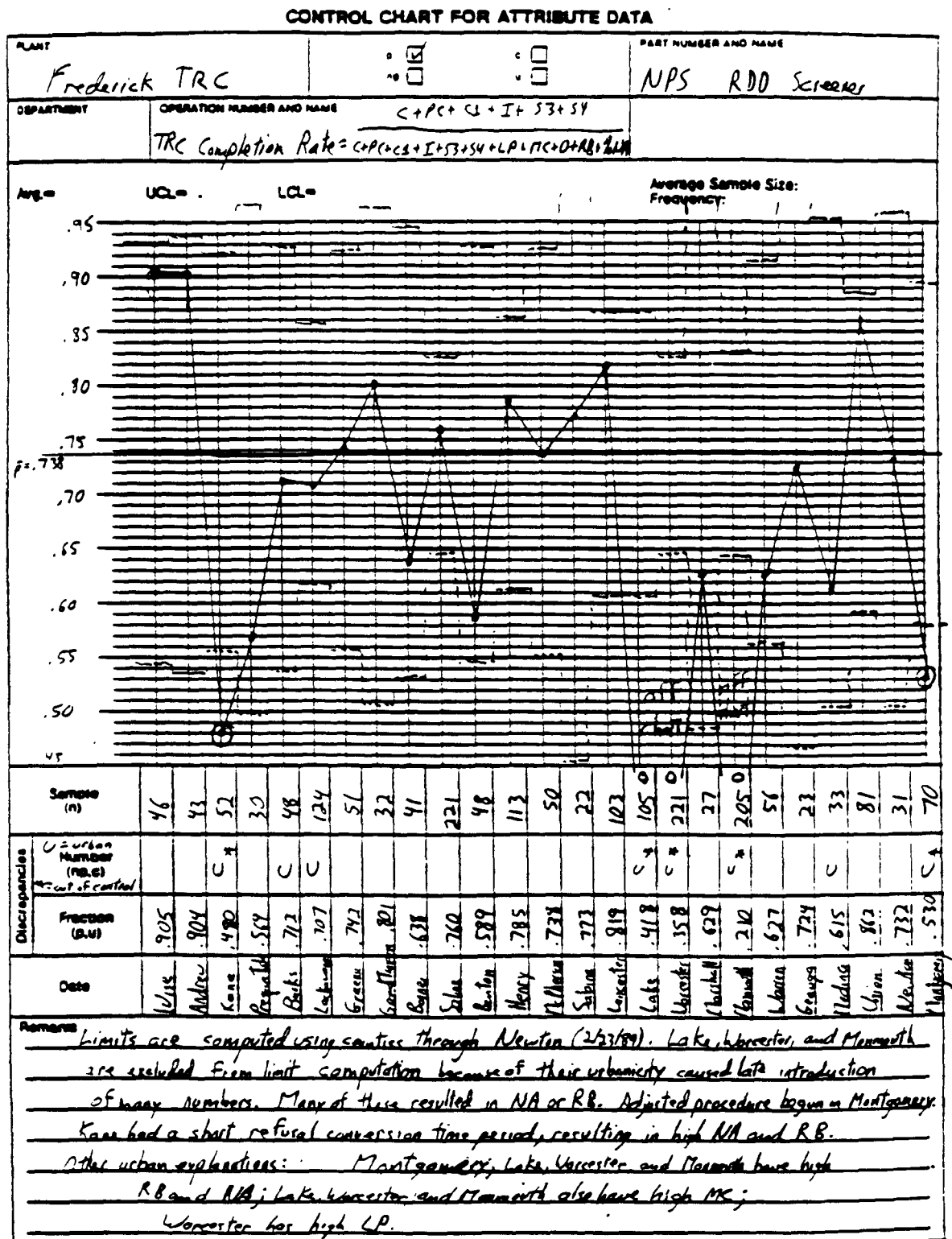


Exhibit 6-4
Zip Code Checklist

EPA DOMESTIC WELLS #918512 0-3-89
3522

NEW LONDON, CT

A. ZIP CODES WHICH COVER PREFIXES DIALED IN [NAME] COUNTY	B. ZIP CODES IDENTIFIED ON MAPPING RESOURCES ?		C. ZIP CODES INCLUDES TARGET (OVERSAMPLED) AREA		D. ZIP CODES ALL IN URBAN AREA ?	
	YES	NO	YES	NO	YES	NO
06249	/	/	/	/	/	/
06254	/	/	/	/	/	/
06320	/	/	/	/	/	/
06330	/	/	/	/	/	/
06333	/	/	/	/	/	/
06334	/	/	/	/	/	/
06335	/	/	/	/	/	/
06336	/	/	/	/	/	/
06337✓	/	/	/	/	/	/
06339	/	/	/	/	/	/
06340	/	/	/	/	/	/
06350✓	/	/	/	/	/	/
06351	/	/	/	/	/	/
06353	/	/	/	/	/	/
06355	/	/	/	/	/	/
06357	/	/	/	/	/	/
06359	/	/	/	/	/	/
06360	/	/	/	/	/	/
06370	/	/	/	/	/	/
06371	/	/	/	/	/	/
06372✓	/	/	/	/	/	/
06375	/	/	/	/	/	/
06376✓	/	/	/	/	/	/
06378	/	/	/	/	/	/
06379	/	/	/	/	/	/
06380	/	/	/	/	/	/
06382	/	/	/	/	/	/
06383✓	/	/	/	/	/	/
06384	/	/	/	/	/	/
06385	/	/	/	/	/	/
06388	/	/	/	/	/	/
06389✓	/	/	/	/	/	/
06415	/	/	/	/	/	/
06439✓	/	/	/	/	/	/
06474✓	/	/	/	/	/	/
06349	/	/	/	/	/	/
	/	/	/	/	/	/
	/	/	/	/	/	/
	/	/	/	/	/	/
	/	/	/	/	/	/

D. WHAT % OF LAND IN COUNTY IS THE TARGET/OVERSAMPLED
AREA ? 11 %

6.2.3 Selection of Households to be Screened

The objective of this task is to identify the subset of households for which to conduct the DWS Screener Survey.

6.2.3.1 Summary of Procedures

The telephone research center (TRC) has a list of all telephone prefixes (the six digit combination of area code and exchange) being used in each county. Each prefix is assigned to one of three categories:

1. Only used in urban or urbanized areas whose residents are by definition ineligible for this Survey;
2. Only used in areas that are to be undersampled (non-target) in the NPS. These prefixes may also include some ineligible areas; or,
3. Used (entirely or partially) in areas that are oversampled.

Prefixes in the first category are excluded from the screener sample. Each of the other prefixes is divided into 100 clusters of 100 numbers each. An eight-digit cluster is defined by appending one of the numbers 00 through 99 to the six-digit prefix. The number of clusters to be screened for cluster identification is taken from the cluster specifications described in Section 6.2.2. This number of clusters is selected systematically from the list of eligible clusters. Clusters are selected in category 2 at one-third the rate of category 3. (Undersampling of respondents in category 3 clusters who are in non-target areas is conducted automatically as part of the CATI programming. If there are no prefixes in category 3, i.e., there are no oversampled areas in the county, then no undersampling of clusters is done.)

Clusters of telephone numbers tend to be released primarily for residential or for commercial use. The TRC will call one telephone number within a cluster to determine whether the telephone number is for a residence or for a commercial establishment and whether they are located in the sampled county. Each number will be tried up to 7 times to determine eligibility. These calls will be made up to a maximum of 3 evening, 2 per daytime, and 2 per weekend calls. This will ensure that eligible wells are not identified as a function of time of day that respondents are at home.

6.2.3.2 Quality Assurance and Quality Control Procedures

The objective of the quality assurance and quality control procedures for selection of households to be screened is to ensure that the correct number of clusters are selected per county. The set of all zip codes in the county for which prefixes are identified will be reviewed by the RDD Screener Supervisor and compared against the maps developed for determining county-specific questions. When additional zip codes are identified on the maps the RDD Screener Supervisor will notify the Cluster Identification Supervisor of the need to check the information from adjoining counties.

The cluster specifications will be reviewed for reasonableness by the Project Director when they are sent to the Cluster Identification Supervisor. Meetings will be held between these staff members to review the sampling procedure used for the initial counties. Progress on identifying clusters will be reviewed daily by the RDD Screener Supervisor. If questions arise concerning the need for additional clusters they will be discussed with the Deputy Project Director and Project Director. The telephone interviewing supervisors will monitor a sample of cluster identification calls as part of their regular monitoring of interviews as described in Section 6.2.4.

6.2.4 Questionnaire Administration

The objective of questionnaire administration is to screen the sample of households identified above for eligibility in the DWS Field Survey. The DWS Screener Questionnaire will be administered as a telephone interview by Westat's TRC using CATI. Up to 7 calls to each telephone number will be made before a case is "closed out."

Responses to the DWS Screener Survey will be directly entered into a database. Daily reports on the number of completed interviews, refusals, and ineligibles will be generated from the database. These reports will be used to monitor the daily progress of the screening Survey. Production reports which compute the number of hours worked, the number of cases completed, and the average time taken to complete a case will be generated.

6.2.4.1 Summary of Procedures

Westat uses a proprietary computer program to conduct CATI Surveys. This program will automatically maintain records of the calls and results.

The interviewer will enter one telephone number at a time into the CATI system. The system will then guide the interviewer through the interview by automatically following skip patterns according to the responses entered by the interviewer. When the interview is completed, the CATI system will assign a disposition code indicating the status of the case. The Call Record will then be sent back to the main TRC building for processing.

An output known as the Respondent Information Sheet (RIS) will be generated from the database. The Respondent Information Sheet contains the respondent's identification number, name, address, and telephone number.

Interviewer Training will be conducted to provide step-by-step guidance to the interviewer throughout every phase of screening Survey interview and CATI operations. Interviewer materials and Survey-specific training will provide the interviewer with a clear set of procedures and complete reference documents to use during the telephone Survey.

Westat will be responsible for conducting training specific to this Survey interview and developing and reproducing the interviewer training materials. Interviewer training will consist of a two day

training session specific to the DWS Screening Survey. Westat will prepare a DWS Screening Survey Training Manual for interviewer training (Appendix E).

Interviewer training for the DWS Screening Survey will include:

- Introduction to the purpose and content of the DWS Screening Survey;
- Question-by-question review of the Survey questionnaire;
- Review of the Interviewer Training Manual;
- Interviewer role playing; and
- Question and answer sessions to review Survey procedures.

6.2.4.2 Quality Assurance and Quality Control Procedures

The objective of the quality assurance and quality control procedures for administration of the DWS Screening Questionnaire is to ensure that the information obtained by administering the screening questionnaire is consistent across all counties. Inherent in the programming will be the following quality assurance and quality control procedures:

- Skip pattern logic of the CATI questionnaire is fully computerized so that interviewer choice in question branching is eliminated;
- The wording of questions appropriate to the respondent's county is automatically performed for the interviewer by the CATI software;
- Validation of response codes for closed-ended questions is performed by the CATI software during the interview so that invalid codes cannot be entered into the data files;
- Internal logic checks are pre-programmed for on-line editing of the questionnaire as it is being administered; and
- Consistency between certain related interview items is automatically checked by the CATI software. The system will instruct the interviewer to re-ask the question or probe for additional information in the event that inconsistent entries are detected. This minimizes respondent error and interviewer entry error.

The following additional procedures will also be followed to ensure the quality of the actual DWS Screening Survey interview:

- Monitoring of interviewers by supervisory and project staff;
- Maintaining telephone supervisor problem logs;
- Producing daily and/or weekly production reports; and
- Conducting frequent meetings between telephone interviewers, programmers, supervisors, and project staff during which problems will be reviewed.

Coding and editing of screening data will be performed by the CATI computer programs. Additional procedures include daily and weekly reports generated and reviewed by the management staff.

The objective of monitoring the screening interviewing activities is to ensure that the questionnaire is administered consistently across all interviews. CATI Interviewing Supervisors will conduct interview monitoring. At least five percent of the interviews will be monitored. The interviewers will not know when they are being monitored. A debriefing session will be held with the interviewers to identify any problems that have occurred during the screening interview process. A copy of the interviewing monitoring form completed by the supervisor is shown as Exhibit 5-2.

6.2.5 Selection of Field Sample

The objective of the selection of the field sample is to identify a sample of DWSs that meet the Survey eligibility criteria and represent DWS wells in the 48 continental states of the U.S. Westat is responsible for developing, reviewing, and implementing the sampling plan. This will be done by compiling the DWS Screening Survey results to determine whether the required number of eligible respondents have been contacted for each county.

At the end of each DWS Screening Survey, the interviewer will set up a tentative time for the DWS Field Team to interview the respondent. All interviews in a county are to be completed during a 2 week period. A calendar for this period and a map of the county will be posted on an easel in the CATI area during the telephone interviews. Interviewers will attempt to make these appointments during the first week of the field period. Respondents will be told that these appointments are just tentative and that they will be contacted by telephone prior to the scheduled appointment to confirm the date and other aspects of the operation.

A minimum of three hours will be scheduled between appointments. After making the appointment and completing the interview, the interviewer will fill in the time period on the calendar that has just been assigned to prevent the assignment of the same time slot to more than one respondent.

All relevant information from the interview will be summarized on a Respondent Information Sheet (RIS) and sent to ICF well in advance of the commencement of field activities for that DWS.

6.2.5.1 Summary of Procedures

The DWS Screening Survey is scheduled to take roughly three weeks for each county. Throughout the three week screening period, the DWS Screening Survey Manager will review the DWS Screening Survey results to determine whether the required number of eligible respondents have been identified in the county. One of two conditions will exist as shown below:

- Based upon initial results for the county, it is anticipated that completing the original set of selected telephone numbers (number of clusters multiplied by the amount of telephone numbers per cluster) will provide at least the required number of sampled households. All remaining cases without final status codes will continue to be processed as planned, with final close-out of the county three weeks after work commenced.
- Based upon initial results for the county, it is not anticipated that completing the original set of selected telephone numbers will provide the required number of sampled households. It will then be necessary to begin work on additional telephone numbers. This will either be accomplished by increasing the amount of telephone numbers per cluster or by increasing the number of clusters. This decision will be made by the Deputy Project Manager, in consultation with the Project Manager as needed. The general procedure will be as follows: if no more than two sampled households are from any single cluster the amount of numbers per cluster will be increased; if some clusters already contain at least three sampled households the number of clusters will be increased (using the reserve clusters identified earlier, see Section 6.2.2). If such an increase would cause the total amount of telephone numbers called in a county to exceed 1,000, the Westat Project Director will review the situation with the ICF Project Director to examine the cost/benefit trade-offs.

When a county is closed-out in the telephone center the DWS Screener Survey Manager will review the number of sampled households that have been selected. (To be a sampled household a case must either be coded as a complete (C) or a partial complete missing only farmer information (PCF).) There are three possible situations as shown below:

- The number of sampled households is equal to the number that was desired. The respondent information sheets will be printed and sent to ICF by the Screener Survey Manager.
- The number of sampled households is less than the number that was desired. This can only happen when an excessive number of telephone calls are required and the ICF Project Director has given permission to close-out the county. The RISs will be printed and sent to ICF by the Screener Survey Manager.
- The number of sampled households is greater than the number that was desired. The sampled households must be subsampled to achieve the desired total. The procedure used for systematic subsampling is given below. The RISs for the selected subsample will be printed and sent to ICF by the Screener Survey Manager.

The method of systematic random subsampling will be as follows:

Given:

C = Number of complete, eligible respondents

R = Required number of complete, eligible respondents

$C > R$

n = number complete, eligible respondents to be dropped

I = skip interval

Sort C by oversampled/undersampled.

$$n = C - R$$

$$l = C/n$$

Select a random number, RN, where $0 \leq RN \leq l$.

Compute the list RN, RN+l, RN+2l,..., RN+(n-1)l.

The respondents to be dropped are those on the sorted list corresponding to the numbers just computed, rounded up to the nearest integer.

6.2.5.2 Quality Assurance and Quality Control Procedures

The objective of the quality assurance and quality control procedures for the selection of the field sample is to ensure that the procedures for identifying the sample of DWSs for inclusion in the DWS Field Survey are executed accurately and consistently across all counties. All final decisions regarding the selection of the field sample will be made by the DWS Screening Survey Manager. This will ensure the consistency of the selection process. The systematic random subsampling method ensures accuracy and consistency in the selection of the field sample in the event that more than the required number of eligible respondents is identified.

6.3 Domestic Well Field Survey (DWS)

The purpose of the DWS Field Survey is to collect and analyze information pertaining to the domestic wells from which water samples are drawn. This information is collected through the administration of three "instruments," the DWS Questionnaire, the DWS Team Leader Introduction and Well Observation Record, and the Local Area DWS Questionnaire. Examples of these instruments appear in Appendix F.

6.3.1 Questionnaire Preparation

The objective of questionnaire preparation is to ensure that the instruments used in the DWS Field Survey are worded and formatted such that they collect the information specified by EPA to satisfy the objectives of the DWS Field Survey. Specifically, the information that is gathered includes, but is not limited to, depth of the well, well construction characteristics, water treatment, depth to groundwater, general aquifer characteristics, soil texture in the immediate vicinity of the well, and pesticide usage in the vicinity of the well. Westat will modify the Survey instruments developed from the pilot phase of the NPS and incorporate ICF's and EPA's comments.

6.3.1.1 Summary of Procedures

The DWS Questionnaire and DWS Team Leader Introduction and Well Observation Record will be completed in the field at the time of well water sampling. The respondent for the first part of the DWS Questionnaire and the DWS Team Leader Introduction will be the head of household or the spouse of the head of household for the residence contacted during the screening Survey. The DWS

Questionnaire will be designed to collect information regarding water usage, water treatment, well construction, pesticide use and farming practices. The section on farming practices will be asked of all farmers of the well property in the last 5 years. Well construction information will be asked of the well owner. These may or may not be the head of household or spouse of the head of household in the selected residence. The DWS Team Leader Introduction portion of the DWS Team Leader Introduction and Well Observation Record will introduce the respondent to the Survey by presenting an overview of the Survey objectives.

The DWS Well Observation Record portion of the DWS Team Leader Introduction and Well Observation Record will be completed by field team members during well water sample collection activities. This instrument will be used by the field team to record information regarding soil characteristics and other significant features in the vicinity of the well.

The Local Area DWS Questionnaire will be administered to a person familiar with local conditions and usage of land surrounding the DWS being sampled. This person will usually be the County Agricultural Extension Agent. This interview should be conducted within one week of the well water sampling activities.

All completed instruments will be sent to Westat for data preparation. Once the records are received, they will be entered into a receipt control file.

6.3.1.2 Quality Assurance and Quality Control Procedures

The original DWS pilot questionnaires were prepared and pretested by EPA and supplied to Westat. The questionnaires were reworded and reformatted by Westat, and reviewed by in-house experts as well as by ICF and EPA. EPA will review the revised questionnaires before they are used in the Survey.

6.3.2 Questionnaire Administration

The objectives of questionnaire administration are to introduce the respondent to the Survey and collect information regarding water usage, water treatment, well construction, farming practices, and pesticide usage.

6.3.2.1 Summary of Procedures

The DWS Questionnaire will be administered to collect the information regarding water usage, water treatment, well construction, farming practices, and pesticide usage. The Team Leader Introduction portion of the Team Leader Introduction and Well Observation Record will be administered by ICF personnel to introduce the respondent to the Survey by presenting an overview of Survey objectives. (The member(s) of the field team responsible for collecting the water samples will complete the Well Observation Record portion of the Team Leader Introduction and Well Observation Record.) Trained Westat personnel will administer the DWS Questionnaire.

Appointments will be made for interviews with household residents, well owners, and farmers prior to the field visit. The initial respondent will be the head of the household or their spouse. If additional farmers or well owners are discovered during the interview the Westat interviewer will contact that person and arrange to conduct the interview at a convenient time during the two-week sampling period. Whenever an interview is being conducted without concurrent well sampling the Westat interviewer will introduce the respondent to the Survey. Upon completion of the DWS Questionnaire the interviewer will assist with water sampling activities. (For more details on water sampling see the Well Sampling, Data Collection, and Processing Quality Assurance Project Plan.)

The interviewer will contact the local county agent to confirm the appointment scheduled by the DWS Field Director. Before conducting the county agent interview the interviewer will drive to all wells that still remain to be sampled to accurately identify their location. This information will then be used to describe the locations in question to the county agent, while retaining the maximum level of respondent confidentiality possible.

Upon arrival at the well site, the Field Team Leader will locate the respondent and introduce the respondent to the other field team member(s). The Westat employee will seek a convenient location in which to administer the questionnaire while the other field team member(s) begin the water sample collection procedures. The Westat employee will ask the questions in the questionnaire following the appropriate skip patterns. The responses will be recorded in pencil directly in the questionnaire. Upon completion of the questionnaire, the interviewer will answer any questions the respondent may have regarding the Survey.

6.3.2.2 Quality Assurance and Quality Control Procedures

The objective of the quality assurance and quality control procedures for questionnaire administration is to ensure that the information collected through administration of the questionnaire is recorded accurately and that the questionnaire administration is performed consistently across all counties. Westat will employ the following procedures to ensure the quality of the questionnaire administration:

- Interviewers will receive one-and-one-half days of Survey-specific training given by the Deputy Project Director and other project staff. The training will include question-by-question discussion of the questionnaires and role playing. Each interviewer will be provided with a manual to assist with training and to serve as a reference during interviews.
- Interviewers will be observed by the Deputy Project Director and other project staff during the training role plays. Interviewers showing difficulty in understanding or administering the questionnaires will be given additional training until they demonstrate an acceptable skill level. In extreme cases, interviewers may be dismissed from the study.

- Interviewers will review all questionnaires before leaving an interview site to insure completeness of all responses.
- Interviewers will make marginal comments that can be further evaluated at a later time when additional information is offered that may be relevant to the Survey.
- Interviewers will conduct an initial edit of all questionnaires before returning them to the DWS Field Supervisor.
- Interviewers will remain in frequent contact with the DWS Field Supervisor as needed. This will typically result in telephone contact every other day.
- In-field quality audits will be conducted by the NPS QA Officer and Westat supervisory staff. This will include the Project Director, Deputy Project Director, and the DWS Field Supervisor. Westat auditors will use the Field Observation Form (Exhibit 6-5). This form includes a check list on general interviewing techniques, a listing of strengths and weaknesses of the interviewer's performance, and summarizes the review discussed with the interviewer.

6.3.3 Questionnaire Receipt Control

The objective of questionnaire receipt control is to identify questionnaires that are not returned from the field in a timely manner so that the progress of the field work can be accurately measured.

6.3.3.1 Summary of Procedures

The receipt control of the DWS questionnaires from the field is based upon the identification labels attached to each individual questionnaire. The identification number is of the form xx-xx-xxxx-x. The first two digits refer to the first-stage stratum to which the county belongs (01 - 12); the second two digits are a county identification number corresponding to the order in which they are surveyed (00 - 84); the next four digits are the unique identifier for that well, attached to the case as part of the DWS Screener Survey; the final digit identifies the type of questionnaire (1 for the DWS main questionnaire/local area questionnaire, and 2 for the Team Leader Introduction and Well Observation Record). Labels with the appropriate 9-digit identification will be attached to the front of each questionnaire by the DWS Field Supervisor before they are mailed to the field team.

Questionnaires will be returned by the interviewer to the Field Supervisor after completion of questionnaire administration in a county. The ICF Team Leader will have the option of giving the Team Leader Introduction and Well Observation Records from an entire county to the Westat interviewer for mailing or mailing them to the Westat Field Supervisor directly.

Tracking of returned DWS questionnaires within Westat will be automated using a system analogous to that described for the CWS in Section 5.2.5. Mail-out and receipt information will be entered into the system by scanning the bar code label on the front of each questionnaire. The result code for each section of the questionnaires will be key entered into the system to provide information on the completeness of each section.

Exhibit 6-5
Field Observation Form

Interviewer: _____ Date: _____
Observer: _____ WELL ID: _____
Site: _____

I. General Interviewing Techniques

1. Reading questions
2. Probing.
3. Recording answers
4. Following skip patterns
5. Use of cards
6. Maintaining good rapport with respondent

	E	G	T	S
1.				
2.				
3.				
4.				
5.				
6.				

* Check the completed questionnaire to get this information.

If nonresponse, explain: _____

II. List below the strengths and weaknesses of this interviewer's performance:

1. Strongest points:

2. Weakest points:

III. Summarize your conversation reviewing this observation with the interviewer (what points did you talk about what was interviewee's response to your comments, etc.):

IV. Other comments/recommendations about the interviewer's performance:

6.3.3.2 Quality Assurance and Quality Control Procedures

The objectives of the quality assurance and quality control procedures for questionnaire receipt control are to ensure the knowledge of the status of all questionnaires. When questionnaires are initially sent out to the field the DWS Field Supervisor will complete a DWS Transmittal Sheet documenting the contents of the package, along with the date and names of who sent it and to whom it is addressed. Exhibits 6-6 and 6-7 are examples of Transmittal Sheets used to send forms separately to the Westat interviewer and ICF Team Leader, respectively. When the questionnaires are returned to Westat they must be accompanied by similar transmittal sheets.

The Field Supervisor then indicates the status of each questionnaire on the Receipt Control Form (Exhibit 6-8). For the main questionnaire it is necessary to indicate the status separately for each section of the questionnaire. This form is then used for the key entry described in Section 6.3.3.1.

6.3.4 Initial Editing and Data Retrieval

The objective of initial editing and data retrieval is to ensure completeness of all questionnaires and to collect missing information in a timely method.

6.3.4.1 Summary of Procedures

Upon receipt of all questionnaires from the field, the DWS Field Supervisor will review the questionnaires for completeness. The supervisor will review all marginal comments for clarity. Whenever missing information is discovered the supervisor will call the field interviewer and clarify the items in question.

6.3.4.2 Quality Assurance and Quality Control Procedures

The Deputy Project Director and Project Director will be regularly informed of the status of incoming questionnaires by the Field Supervisor. When a questionnaire reveals a situation with which the Field Supervisor is not familiar and which is not explicitly discussed in the training manual the supervisor will refer the situation to either the Deputy Project Director or the Project Director. If necessary, they will consult with the ICF Project Director or his designee for further clarification.

6.3.5 Data Preparation and Data Entry

The objective of data preparation and data entry is to create a data file containing the data from the returned questionnaires. A separate file will be created for each of the three types of questionnaires. This is necessary before the information can be properly stored and analyzed.

6.3.5.1 Summary of Procedures

Westat will use the COED system described in Section 5.2.6. for Data Preparation. The procedures and quality assurance and quality control measures for data preparation and data entry for the domestic well survey are exactly the same as those used for the CWS survey detailed in Section 5.2.6.

Exhibit 6-6
Westat Interviewer Transmittal Sheet

DWS Transmittal Sheet

Date: 11 22 89
month day year

FROM: S. AUSTENSEN
Name of Person sending information/city, state

TO: DIANE LINDELL
Name of Person receiving information

Information
Being Sent:

☒
☒
☒
☐
☐

County Map
Sampling Schedule
Interviewer Package Check
Team Leader Package Check
Other: _____

DWS
Booklet:

Well Observation
Record:

ID Number

☒
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D-10-75-0910
D-10-75-0911
D-10-75-0912
D-10-75-0917
D-10-75-0918
D-10-75-0922
D-10-75-0924
D-10-75-0939
D-10-75-0940
D-10-75-0941
D-10-75-0944
D- - - - -

Exhibit 6-7
ICF Team Leader Transmittal Sheet

DWS Transmittal Sheet

Date: 11 22 89
month day year

FROM: S. AUSTENSEN
Name of Person sending information/city, state

TO: RICK ZOLTUN
Name of Person receiving information

Information
Being Sent:

☐ County Map
☐ Sampling Schedule
☐ Interviewer Package Check
☒ Team Leader Package Check
☐ Other, _____

DWS Booklet:	Well Observation Record:	ID Number
<input type="checkbox"/>	<input checked="" type="checkbox"/>	D-10-75-0910
<input type="checkbox"/>	<input checked="" type="checkbox"/>	D-10-75-0911
<input type="checkbox"/>	<input checked="" type="checkbox"/>	D-10-75-0912
<input type="checkbox"/>	<input checked="" type="checkbox"/>	D-10-75-0917
<input type="checkbox"/>	<input checked="" type="checkbox"/>	D-10-75-0918
<input type="checkbox"/>	<input checked="" type="checkbox"/>	D-10-75-0922
<input type="checkbox"/>	<input checked="" type="checkbox"/>	D-10-75-0924
<input type="checkbox"/>	<input checked="" type="checkbox"/>	D-10-75-0939
<input type="checkbox"/>	<input checked="" type="checkbox"/>	D-10-75-0940
<input type="checkbox"/>	<input checked="" type="checkbox"/>	D-10-75-0941
<input type="checkbox"/>	<input checked="" type="checkbox"/>	D-10-75-0944
<input type="checkbox"/>	<input type="checkbox"/>	D- - - - -

1 of 1
page of page

Example of a Completed Receipt Control Form

• • •

6.3.6 Data Analysis and Reporting

The objectives of data analysis and reporting are to summarize well construction characteristics, well water treatment, farming practices, pesticide usage, and soil textures in the vicinity of the well, and other information collected during the DWS Field Survey. This information will be merged with the well water chemical analyses to determine how pesticide usage is related to groundwater vulnerability. The procedures and quality assurance and quality control measures for data analysis and reporting for domestic wells are similar to those for CWSs detailed in Section 5.2.7.

There are three additional quality control procedures available for the DWS that are not available for the CWS. These include:

- Debriefing of interviewers will provide valuable information on the ability of respondents to understand and respond to particular questions; and
- Comparing Second-stage County Agent Questionnaire responses with the DWS Local Area questions to measure consistency.
- Post-stratifying NPS results to the number of rural wells on farmed and non-farmed property by Census Region, to the value calculated in the 1987 American Housing Survey.

6.3.7 Systems Security and Data Backup and Archival

The objective of systems security and data backup and archival is to establish and maintain a system for the ongoing protection of data. The procedures and quality assurance and quality control measures for DWS data are identical to those described for CWS data in Section 5.2.8.

APPENDIX A

CWS Screening Survey Training Manual

APPENDIX B

**For blank copies of the
CWS Questionnaire,
CWS Team Leader Introduction and Well Observation Record, and
Local Area CWS Questionnaire
see Appendix D of the Phase I Report**

APPENDIX C

Calculation of Cluster Specifications

APPENDIX D

STANDARD OPERATING PROCEDURES

- 1. TITLE:** Development of CATI Questions
- 2. AREA OF RESPONSIBILITY:** NPS DWS Well Screening Survey
- 3. GENERAL REQUIREMENTS:**

- a. Methodology**

Westat TRC personnel will identify where urban areas of each county exist in relation to the target areas by using Second-Stage County Cropped and Vulnerable Maps and a Rand McNally Zip Code Atlas. TRC personnel will prepare county-specific questions to identify the location of each household in relation to the target and urban areas for the purpose of determining the eligibility of each household for inclusion in the DWS Field Survey.

- b. Equipment and Materials Required**

- i. Second-Stage County Cropped and Vulnerable Map
- ii. Rand McNally Zip Code Atlas

- 4. PROCEDURE:**

The Second-Stage County Cropped and Vulnerable Maps are received from ICF and logged in the Second-Stage Map Receipt Check Sheet in the Mapping Workbook. These maps are then sent to the Telephone Research Center (TRC) office in Frederick, MD. The remaining procedures are executed by the TRC personnel using these Second-Stage County Cropped and Vulnerable Maps.

1. Obtain copies of detailed county maps from the county seat, city or town halls, and State Department of Transportation. These maps should include highways and other landmarks.
2. Draw urban areas and major landmarks onto the second-stage maps using local maps of the county. Complete the zip code checklist and develop the urban area and target area questions for the CATI County-Specific Questions. The Zip Code Checklist includes the following steps:

- (a) Draw zip code boundaries on the Second-Stage Map using the Rand McNally Zip Code Atlas. Compare the computerized zip code list to the zip codes found on the Rand McNally map.
- (b) Resolve any discrepancies by calling the post office in the county or through other appropriate action. Note any discrepancies found on the Zip Code Check List.
- (c) Indicate if the target area is included in the zip code area for each zip code in the county.

- (d) Determine if the county is urban or rural.
 - (e) Draw urbanized area(s) on the target map using census information.
 - (f) Estimate the percent of land covered by the target area and enter the percentage on the bottom of the check list. Urban areas are not included in the estimation.
 - (g) Forward the completed checklist to the DWS Survey Manager.
3. Write "city limit" questions to determine whether or not a household lies within the city limits of any cities to be excluded from the Survey.
 4. Write questions describing the boundaries of the urbanized areas to determine whether or not a household lies within any urbanized areas in the county to be excluded from the Survey. (Urbanized areas are defined by the Census Bureau as urban in character but not part of an incorporated city or town.)
 5. Overestimate rather than underestimate the urbanized area where the boundaries of the urbanized area are unclear.
 6. Identify zip codes within the county that are located within the target area.
 7. Identify the physical boundaries of the target area within each zip code which contains a target area using key landmarks such as rivers, mountains, highways, etc. Describe areas "between" two or more landmarks rather than using compass directions.
 8. Consult local county personnel, such as the County Planning Department, the County Clerk, or other local county officials where landmark recognition may be questionable to determine whether or not residents are familiar with the landmarks.
 9. Travel to Westat's Twelve Oaks office on the day that the Zip Code Checklists are due for specific counties. Attend the meeting with the other TRC personnel, the CATI Preparation Supervisor and the DWS Survey Manager.
 10. Review the Zip Code Checklists with the Map Boundaries Supervisor and the Mapping and Cluster Specifications Manager. The final decisions regarding the smoothing of boundaries will be made by the DWS Mapping and Cluster Specifications Manager.
 11. Use the Zip Code Checklists to calculate the Cluster Specifications. The procedures for calculating cluster specifications are described in Appendix C.
 12. Review the urban area and target area questions for the CATI County-Specific Questions with the other TRC personnel, the CATI Preparation Supervisor, the DWS Survey Manager and the CATI Programming Supervisor. The CATI Preparation Supervisor will confirm that the TRC personnel have verified the landmarks and roads that are to be used for the county-specific questions. Bring the telephone log sheets to the meeting and give them to the CATI Preparation Supervisor for filing.

13. Following approval, send the county-specific questions to CATI programming by the start date for CATI Programming and Testing listed in the Master Schedule. Place a copy of the questions in the log and give another copy of the questions to the DWS Survey Manager.

Upon completion of the CATI programming, the CATI Preparation Supervisor will log onto the VAX and test the program by completing a dummy interview. This testing will be completed by the end date listed on the CATI Programming and Testing Master Schedule. The testing will include every path for the urban area and target area questions to ensure that the programming is correct. A check mark will be placed beside each path after that path has been tested and its correctness verified using a copy of the questions as a guide. The testing can be restricted to the urban area and target area questions as the remainder of the CATI questions do not change from county to county.

APPENDIX E
DOMESTIC WELL SCREENING
SURVEY TRAINING MANUAL

APPENDIX F
DOMESTIC WELL SURVEY
INTERVIEWER TRAINING MANUAL