



*U.S. DEPARTMENT OF COMMERCE
Office of Inspector General*



U.S. CENSUS BUREAU

*Valuable Learning Opportunities
Were Missed in the 2006 Test of
Address Canvassing*

Final Report No. OIG-17524/March 2006

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RELEASE**

Office of Inspector General



UNITED STATES DEPARTMENT OF COMMERCE
The Inspector General
Washington, D.C. 20230

MAR 31 2006

MEMORANDUM FOR: Charles Louis Kincannon
Director, Bureau of the Census

FROM: Johnnie E. Frazier

A handwritten signature in black ink, appearing to read "Johnnie Frazier", written over the printed name.

SUBJECT: Final Report No. OIG-17524
*Valuable Learning Opportunities Were
Missed in the 2006 Test of Address Canvassing*

As a followup to our February 21, 2006, draft report, attached is the final report on our review of select aspects of the address canvassing operation for the 2006 Census Test. This is the second site test of concepts, proposed systems, and procedures being explored for a reengineered 2010 decennial census. An executive summary of our findings begins on page i.

We found that the bureau achieved some important objectives for the address canvassing operation of the 2006 test and, at the same time, missed valuable learning opportunities because the handheld computers suffered from frequent crashes, data loss, slow performance, and problems with collecting GPS coordinates. Our review identified a number of specific areas in need of management attention, including improving system development practices, developing a process for conveying final automation requirements to the Field Data Collection Automation (FDCA) contractor, improving maps and address canvassing procedures, and devising methods for disclosing enough information about quality control failures to production managers so they can take timely action to improve listers' work during address canvassing. Also, the bureau needs to develop a fully functional partnership program database to enhance its outreach to increase participation among hard-to-count groups and to better address issues of overtime, cellular telephone usage, and training.

Finally, our report raises questions about the costs and benefits of conducting 100 percent address canvassing. Continuously maintaining the master address file to permit targeted address canvassing was a cornerstone of the original reengineered design for the 2010 decennial. Reverting to 100 percent address canvassing has added \$38 million to the bureau's estimate of life-cycle costs for the census. And while this may well be what will, or even



should happen, Census has not provided any evidence that 100 percent address canvassing produces an address list that is more accurate than one that could be produced with an alternative methodology. At a minimum, the bureau should identify and document the most cost effective approach to obtaining a list of the quality needed to support the 2010 decennial goals for accuracy of census coverage, cost containment, and operational risk.

A summary of our recommendations appears on pages 42 and 43 of the final report. We request that you provide us with an action plan describing the actions you have taken or plan to take in response to the recommendations within 60 calendar days.

We appreciate the cooperation and courtesies extended to us during our review by Census Bureau headquarters, and regional and local office personnel. If you would like to discuss this report or the action plan, please call me at (202)482-4661 or Judith Gordon, Assistant Inspector General for Systems Evaluation, at (202)482-6186.

Attachment

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EXECUTIVE SUMMARY

The decennial census is a constitutionally mandated population count conducted for the purpose of reapportioning seats in the U.S. House of Representatives. Decennial census data is also used for a myriad of other purposes, such as redrawing state legislative district boundaries and allocating federal funds to state and local governments. Decades of decennial censuses have provided official, uniform information on the nation's social, demographic, and economic trends. Because of its importance, the decennial census should be as accurate and complete as possible.

The Census Bureau has reengineered its strategy for the 2010 decennial to improve accuracy, reduce risks, and contain costs. The new strategy is intended to (1) replace the decennial long form with a smaller annual survey known as the American Community Survey, (2) improve the bureau's address list and geographic database, and (3) conduct a program of early planning, development, and testing culminating with a 2008 dress rehearsal of the actual 2010 census.

The 2006 test is the second of two scheduled site tests of concepts, systems, and procedures being explored for the reengineered census. The test is being conducted in two locations—a portion of Travis County, Texas, that included parts of the city of Austin and its suburbs, and the Cheyenne River Reservation and Off-Reservation Trust Land in South Dakota. Address canvassing, the first large-scale operation of the test, is intended to ensure that the bureau's address file and digital map database are current and complete. During this operation, temporary field staff, referred to as listers, verify, update, add, or remove addresses; add and delete streets to correct the maps; and annotate the location of addresses on the maps. The updated information is used in subsequent census operations to contact every household either by mail or personal visit and has a direct bearing on the bureau's ability to accurately count the population. Address canvassing training for the 2006 test began in June 2005 and the listing ran from late July through mid-September 2005.¹

Table 1: Site Listers & Workload

	Travis County	Cheyenne River	Total
Listers	234	26	260
Addresses	210,242	3,012	213,254

Office managers, staff, field supervisors, and crew leaders are not included in the counts.

Source: U.S. Census Bureau

An OIG team drawn from our offices of Audits, Inspections and Program Evaluations, and Systems Evaluation reviewed selected aspects of the address canvassing operation in the 2006 site test to assess (1) efforts to automate address canvassing using handheld computers and associated systems; (2) methods for correcting the address lists and maps; (3) quality control processes; (4) outreach activities; and (5) lister training, and other components of the management, administrative, and logistical support for the 2006 test. We primarily conducted our review from June through December 2005 at bureau headquarters in Suitland, Maryland; the Denver, Colorado, regional office; and the two test sites—Travis County, Texas, and the Cheyenne River Reservation in South Dakota.

¹ April 1, 2006 is Census day. Enumeration operations occur in 2006: update/enumerate on the Cheyenne River Reservation from March to May, group quarter's enumeration from April to May, and nonresponse follow-up in Travis County from April to July.

We concluded that the bureau only partially achieved its objectives for the address canvassing operation of the 2006 test and missed a number of opportunities to learn valuable information to apply to the decennial. Specifically, our review disclosed the following.

Unreliable handheld computers interfered with the test. Because of significant difficulties developing the HHC software, Census could not successfully complete each testing cycle. As a result, the bureau decided to delay address canvassing by 1 month to further test and correct the software. Although serious problems remained, the bureau decided to proceed with address canvassing, with the goal of learning as much as possible about using HHCs for this operation. As in 2004, the HHCs suffered from frequent crashes, data loss, slow performance, and problems associated with collecting global positioning system coordinates. Also, last minute changes to fix the HHCs rendered some of the training material out of date. The unreliable HHCs had a significant impact on canvassing operations—neither test site reached its production numbers and canvassing was extended an additional 10 days in an attempt to make the address list as complete as possible for the remaining 2006 test operations.

In addition, GPS functions for collecting address coordinates worked only intermittently and were often slow to activate. Preliminary test results suggest that the coordinate collection software on the HHCs may have incorrectly calculated address coordinates. This problem, in conjunction with the HHC reliability problems, diminishes what the bureau can learn from the test. GPS functionality for navigation and coordinate collection needs to be fixed and tested under real operating conditions before the 2010 decennial to see whether it meets performance and procedural requirements.

A major purpose of the 2006 site test is to identify lessons learned in automating key Census operations in order to refine requirements for the Field Data Collection Automation (FDCA) contract, which will produce the HHCs. Time is running out for identifying and documenting automation issues and competitively negotiating the cost of changes to address canvassing requirements prior to contract award. (See page 6.)

Map errors and inadequate procedures further complicated address canvassing. The 2006 test provided the opportunity to assess the accuracy of the maps installed on the handheld computers, their success at guiding listers to specific addresses, and the ease with which listers could modify maps and addresses to match what they encountered on the ground. Although it appeared that the HHC maps accurately represented most areas of the test sites, they contained a number of nonexistent or misplaced roads, which caused problems in 9 of the 44 canvassing efforts we observed: listers in these instances spent excessive time trying to locate their routes and often did not fully canvass their assignment area, may have missed housing units, and failed to correct maps. Ambiguous and incomplete procedures as well as complex block configurations further compromised listers' ability to revise address lists. Finally, as in 2004, the 2006 sites were too limited to test whether Census could expand postal delivery of questionnaires and thereby significantly reduce its own costs for hand delivering them to respondents—all of the Travis County site receives postal delivery, while on the Cheyenne River Reservation, Census will have to hand deliver all questionnaires. The bureau needed a test site that contained a mix of city-style and rural areas, with some of the latter potentially shifting from bureau delivery to postal delivery for Census 2010. Based on a bureau evaluation, it appears that potentially 9.5

million² residences could have been converted to postal delivery, a substantially less expensive method than hand delivering questionnaires. (See page 13.)

New verification process appears feasible, but quality control training and information sharing need improvement. Census has implemented a new procedure during the quality control (QC) process that will more rapidly update the address list. In the past, the delete and house number verifications occurred after the address canvassing operation concluded. In the 2006 test, verification occurred during address canvassing—as soon as an individual assignment area was canvassed, quality control listers verified the canvassing data collected. The bureau’s plan was to report its quality control findings to the local census office (LCO) to improve the listing operation as it progressed. Despite technical problems with the HHCs, quality control listers successfully verified address deletions and house number changes during the address canvassing operation. But weaknesses in training and management reporting, as well as the bureau’s failure to analyze QC data during the operation, undercut the overall success of the quality control process. (See page 23.)

More focus on outreach is needed. The partnership program—a public awareness effort that couples partnership specialists with public and private organizations—is a key component of outreach for the decennial. In Census 2000 the bureau hired some 690 specialists, who partnered with more than 140,000 organizations in an effort to increase participation among hard-to-reach groups. However, a direct connection between outreach efforts, such as the partnership program, and response rates is difficult to quantify. Census spent \$142.9 million on the program (2 percent of the total cost of the 2000 decennial)³ and expects to implement a similar program for the 2010 decennial. In the 2006 test, the bureau missed an opportunity to assess new methods for increasing response among American Indians and other hard-to-enumerate populations and for collecting quantifiable data to evaluate the success of such efforts. The lack of a fully functional partnership program database—containing important historical and logistical details about Census partners—could hamper outreach efforts. (See page 28.)

Census should improve guidance for overtime and cell phone use and test new approaches to training. Planning for the 2010 census offers new challenges, as the automation of key field operations is a new feature of this decennial and uncharted territory for the bureau. We assessed aspects of the administrative and logistic support for the 2006 test and found weaknesses in overtime and cell phone reimbursement policies and training guidance and implementation. (See page 32.)

Valuable learning opportunities were missed in the 2006 test address canvassing operation. The bureau only partially achieved its objectives for the address canvassing operation for the

² In evaluating Census 2000, the bureau reported that 22 million housing units were listed in the address listing operation, all of which would receive hand-delivered questionnaires. The bureau also reported that approximately 43 percent of these were also on an early postal service address file. From this information, we calculated that 9.5 million residences were capable of receiving the questionnaire by mail. See U.S. Census Bureau, January 2002. *The Address Listing Operation and Its Impact on the Master Address File*, Census 2000 Evaluation F.2. Washington, D.C.: Census Bureau.

³ Costs are from October 1997 through September 2000, with \$65.1 million spent on salaries and benefits and the remainder for nonpayroll expenditures such as travel, training, supplies, and postage. From *Review of Partnership Program Highlights Best Practices for Future Operations*, GAO-01-579, August 2001.

2006 test. It gained only limited information about new automation, procedures, and processes to analyze and apply to the decennial. We believe the bureau could have earned a better return on its investment if it had evaluated other aspects of address canvassing and had furnished well-functioning handheld computers.

In addition, after observing the address canvassing operation, we believe that Census needs to better clarify its rationale and decision to canvass 100 percent of the nation for the 2010 decennial census. The bureau had initially intended to target selected areas for canvassing, but now plans to have listers knock on nearly every residential door in the nation—an estimated 115 million addresses—to update the master address file. Census has not provided any analysis justifying the use of 100 percent address canvassing, and it is unclear whether the benefits outweigh the costs. (See page 38.)

A summary of our recommendations can be found on page 42.



In its response to our draft report, the Census Bureau concurred with some of our findings and recommendations, but took issue with others. In particular, it disagreed that valuable learning opportunities were missed, that unreliable handheld computers interfered with the test, and that an analysis of the costs and benefits of 100 percent address canvassing should be performed and less costly alternatives considered. We are requesting that the bureau describe what actions it will take to address our concerns in its action plan. We found several inaccurate statements made in the bureau's response and, where possible, tried to address those inaccuracies.

The bureau stated that it was troubled by the title of the report, noting that additional time, expert staff, and budget would have allowed it to study other research questions, but those resources were unavailable. The bureau pointed out that it selected the most critical questions to research, and that our report does not suggest that some of the research the bureau conducted was less important than research we identified in our report.

We reaffirm our position that valuable learning opportunities were missed. In particular, we would note that OIG never suggested that Census should have devoted additional resources to the test. Rather, we believe the bureau could have utilized the resources (time, staff, and budget) it devoted to the test more effectively. The research questions for the 2006 test were developed before the bureau knew of the significant problems with the handheld computers, which by most accounts, ultimately resulted in a pared down evaluation agenda. Our primary concern here is that some evaluations were eliminated not based on their importance to 2010 planning, but because of the poorly performing HHCs. An undertaking of the magnitude of the 2006 test requires extensive budgetary and staff resources, and this test is one of the few occasions for the bureau to perform large-scale field testing for 2010. Thus, having to reduce the number and content of the planned evaluations clearly represents a missed opportunity.

In disagreeing that the unreliable hand-held computers interfered with the test, the bureau stated, the handheld computers *were* the test. The bureau maintained that it was testing the feasibility of the concept of automating the address canvassing operation. The bureau stated that although originally it had some other test and research objectives, it just needed "...to get through a

dramatically re-envisioned operation.” While Census noted that it did not mean to minimize the problems, it maintained that reaching certain production numbers and receiving updates for all areas was not the real objective. Census said its decision to outsource to industry the development of both the hardware and software was based in part on the challenges and issues the bureau experienced in developing the automated systems for the 2004 and 2006 tests. Moreover, the bureau indicated that the address canvassing prototypes developed by the vendors competing for the Field Data Collection Automation (FDCA) contract have demonstrated the feasibility of using HHCs for address canvassing.

Consequently, we stand by our finding that the unreliable HHCs interfered with the 2006 address canvassing operation and consequently diminished what the bureau could learn from the test. The test objectives documented in the *Census 2006 Test Project Management Plan* laid out higher aspirations than “to get through a dramatically re-envisioned operation.” The plan described research questions that, if answered, would provide essential information for 2010 census planning—including the degree to which automation reduces the time required to collect and process the address canvassing data, whether GPS is a sufficiently accurate method for collecting coordinates, and whether automation improves the quality of the collected data. However, the poorly performing HHCs prevented the bureau from answering these questions. Although the bureau believes that the competing FDCA vendors have demonstrated the feasibility of using HHCs for address canvassing, it remains unclear on what basis time and resource estimates for using HHCs to conduct address canvassing in the 2010 census are being made.

The bureau strongly disagreed with our recommendation to perform an analysis of the costs and benefits of 100 percent address canvassing and consider whether alternative, less costly strategies for developing the address list for the 2010 decennial are feasible. It stated that funding to test alternatives was not available and expressed surprise that OIG might consider anything less than 100 percent address canvassing acceptable because, by definition, some addresses will be left out of the initial address list for the 2010 census.

OIG is not advocating for or against 100 percent canvassing. However, continuously maintaining the master address file to permit targeted address canvassing was a cornerstone of Census’s original reengineered design. Then, with little explanation, the bureau abandoned this aspect of the design, and reverted to 100 percent address canvassing at an estimated increase of \$38 million to the life-cycle costs of the 2010 census.⁴ The bureau has not articulated any alternatives that it may have considered and their relative costs and benefits. By asserting that anything less than 100 percent address canvassing in all areas will result in some addresses being left out of the initial address list for the 2010 census, the bureau implies that 100 percent address canvassing will not miss addresses. Although intuitively appealing in concept, 100 percent address canvassing has significant challenges of its own, and unfortunately, even this expensive operation cannot render a perfect address list—an outcome bureau officials readily acknowledge. Since Census has not provided any evidence that 100 percent address canvassing produces an address list that is more accurate than one that could be produced with an alternative methodology, we question whether the additional expense of 100 percent address canvassing is

⁴ U.S. Census Bureau, March 1, 2004. *Estimated Life Cycle Costs for the Reengineered 2010 Census of Population and Housing*, 2010 Census Planning Memoranda Series No. 27, Washington, D.C.: Census Bureau.

justified. The bureau's challenge—if not obligation—is to identify the most cost effective approach to obtaining an address list of requisite quality to support the 2010 decennial goals for accuracy of census coverage, cost containment, and operational risk.

A synopsis of Census's response to our draft report and our comments are presented after each finding. The bureau also provided technical clarifications on the text of our draft report, which we have incorporated into the final report as appropriate. Census's response is included in its entirety as Appendix C.

INTRODUCTION

Reengineering the Decennial Census

The decennial census is a constitutionally mandated population count conducted for the purpose of reapportioning seats in the U.S. House of Representatives. Decennial census data is also used for a myriad of other purposes, such as redrawing state legislative district boundaries and allocating federal funds to state and local governments. Decades of decennial censuses have provided official, uniform information on the nation’s social, demographic, and economic trends. Because of its importance, the decennial census should be as accurate and complete as possible.

The Census Bureau has reengineered its strategy for the 2010 decennial to improve accuracy, reduce risks, and contain costs. The new strategy is to (1) replace the decennial long form with a smaller annual survey known as the American Community Survey, (2) improve the bureau’s address list and geographic database, and (3) conduct a program of early planning, development, and testing culminating with a 2008 dress rehearsal of the actual 2010 census.

The 2006 Site Test

A site test is a partial census of population and housing that the bureau conducts under realistic conditions in selected areas. The purpose is to determine the validity and effectiveness of a variety of operations, procedures, and systems prior to a decennial census. The Census Bureau is currently conducting such a test (called the *2006 test*) in two locations—a portion of Travis County, Texas, that includes parts of the city of Austin and its suburbs, and the Cheyenne River Reservation and Off-Reservation Trust Land in South Dakota. The bureau chose these two sites because their demographics and geography support test objectives. For example, the Travis County site has a large Spanish-speaking population for testing the use of Spanish language questionnaires, and the Cheyenne River Reservation is a remote area with rural style addresses for testing address canvassing procedures.

Figure 1 presents the decennial field operations being conducted during the 2006 test. For this report, we reviewed the test of address canvassing, which started in mid-2005.⁵

Figure 1: 2010 Census Field Operations Conducted in 2006 Site Test

2010 Census Operations	2006 Test
Address Canvassing *	✓
Group Quarters Validation	✓
Group Quarters Advance Visit	✓
Military Advance Visit	
Remote Alaska Enumeration	
Update/Enumerate	✓
Service Based Enumeration	
Update/Leave	
Hotel and Motel Enumeration	
Transient Night	
Group Quarters Enumeration	✓
Military Enumeration	
Nonresponse Follow-up *	✓
Field Verification	
Coverage Follow-up	✓
Coverage Measurement *	✓

* Field-workers will use handheld computers.

Source: U.S. Census Bureau

⁵ April 1, 2006 is Census day. Enumeration operations occur in 2006: update/enumerate on the Cheyenne River Reservation from March to May, group quarter’s enumeration from April to May, and nonresponse follow-up in Travis County from April to July.

The Travis County site is managed by a local census office (LCO), while the Cheyenne River site has a smaller census field office (CFO) that is managed by the Census regional office in Denver. For address canvassing, the sites have a combined workforce of over 250 listers and a workload of more than 210,000 addresses (see Table 2). Both sites operated as they would during a decennial, with managers, office staff, and listers working under realistic production goal pressures.

	Travis County	Cheyenne River	Total
Listers	234	26	
Addresses	210,242	3,012	213,254

Office managers, staff, field supervisors, and crew leaders are not included in the counts.

Source: U.S. Census Bureau

Address Canvassing Operation

Address canvassing is intended to ensure that the bureau’s address file and digital map database are current and complete. The master address file (MAF) is a computer inventory of every address and physical/location description of every place where people live or stay. The Topologically Integrated Geographic Encoding and Referencing (TIGER®) database is a digital map containing the locations of streets, rivers, railroads, boundaries, and other geographic features for all the territories covered by the decennial census.⁶ Each address and physical/location description in MAF, including geographic locations, is linked to TIGER. Besides address canvassing, the Census Bureau uses other sources to keep the master address file current including the U.S. Postal Service address file and information from local governments. Census also has awarded a contract valued at over \$200 million for making TIGER more accurate by aligning streets and other geographic features on the maps with their true location on the ground.

Similar to the 2000 census address canvassing operation, temporary Census employees (“listers” or “production listers”) travel around (“canvass”) blocks in assigned areas looking at all sites where people live, stay, or could live (i.e., all individual “living quarters”). These listers compare what they discover on the ground to their address list and map. They verify, update, add, or remove addresses to correct the list; add and delete streets to correct the maps; and annotate the location of addresses on the maps. The updated information is used in subsequent census operations to contact every household either by mail or personal visit and has a direct bearing on the bureau’s ability to accurately count the population.

Implementing a quality control (QC) process, to ensure that the data collected meets a predetermined accuracy level, is a standard bureau practice. In both the 2000 census and the 2006 test, a randomly selected portion of a lister’s work was compared against what was seen on the ground. However, in 2000, the personnel that performed the initial listing also conducted the quality review. For the 2006 test a separate staff of listers was hired and trained for the quality control function. In addition, the bureau is testing a new delete verification procedure in the 2006 test. The new procedure requires the QC lister to verify all deleted addresses and house number changes recorded by the initial (production) lister. If deleted addresses are verified as

⁶ The decennial census covers the United States, Puerto Rico, American Samoa, Guam, the Commonwealth of the Northern Mariana Islands, and the U.S. Virgin Islands.

nonexistent, they are removed from the address list.⁷ This new procedure is intended to yield cost savings in subsequent census operations by eliminating unnecessary mailings and visits.

A key feature of the reengineered 2010 census is automated field operations via a handheld computer (HHC) equipped with a GPS receiver and TIGER maps. According to the Census Bureau, if successful, automation of decennial field operations could produce significant cost savings and improve data quality. In 2004, Census tested handheld computers in nonresponse follow-up (NRFU) and determined that they were feasible for use in the field. In the 2006 test, Census is evaluating the use of handhelds for address canvassing.⁸ Listers used the handheld computers to manage work assignments, enter address data, and transmit data to bureau headquarters. They have also used the HHC maps and GPS to locate and navigate blocks and annotate maps with the location of the addresses. Automation also quickly captures deleted addresses and house number changes, allowing the bureau to perform the delete verification procedure during the address canvassing operation rather than subsequently.

Test Objectives

The bureau's overall objective for the 2006 site test is to obtain information needed to make informed decisions about adopting, refining, or rejecting new methods and systems for the 2010 census. For address canvassing, the bureau is primarily evaluating the use of handheld computers and the new delete verification process. According to the bureau, the lessons learned from the test will help determine the feasibility of implementing various automated address canvassing functions, assess the impact of automation on cost and data quality, and refine automation requirements.

The bureau developed the HHC and related automation mainly for testing purposes. For the dress rehearsal and 2010 census, the bureau will hire a contractor to develop and implement field automation and support services. The Field Data Collection Automation (FDCA) contract is scheduled to be awarded on March 31, 2006. Prototypes of the address canvassing systems will be evaluated as part of FDCA source selection. Census plans to incorporate the refined requirements resulting from the test into the FDCA contract.

Another objective of the 2006 test is to determine whether the delete verification and address canvassing operations can be combined. In the past, the bureau separately verified addresses that canvassers had marked for deletion. By shortening the time between marking and verifying an address for deletion, the bureau expects to reduce the errors caused by the status of addresses changing over time. Address canvassing was also the first opportunity for the bureau to evaluate the tribal liaison program initiated on the Cheyenne River Reservation. In addition, new methods for distinguishing separate living quarters (places where occupants live separately and have direct access, such as a single-family house, mobile home, or apartment) and group quarters

⁷ Addresses are not deleted from the MAF, they are flagged and removed from the address list for this test.

⁸ Census also plans to test new handheld computer functions in the 2006 nonresponse follow-up, such as time keeping, and in the coverage measurement operation at the Travis County test site.

(places where unrelated people live or stay such as a nursing home or college dormitory) are being tested.

Office of Inspector General Oversight

This report details our review of the 2006 address canvassing operation and is the fifth in a series on the bureau's preparation for the 2010 census.

Office of Inspector General Reports on 2010 Decennial Census Program

1. *Improving our Measure of America: What Census 2000 Can Teach Us in Planning for 2010*, Report No. OIG-14431, Spring 2002
2. *MAF/TIGER Redesign Project Needs Management Improvements to Meet Its Decennial Goals and Cost Objectives*, Report No. OSE-15725, September 2003
3. *Improving Our Measure of America: What the 2004 Census Test Can Teach Us in Planning for the 2010 Decennial Census*, Report No. OIG-16949, September 2004
4. *FDCA Program for 2010 Census Is Progressing, but Key Management and Acquisition Activities Need to be Completed*, Report No. OSE-17368, August 2005

OBJECTIVES, SCOPE, AND METHODOLOGY

An OIG team drawn from our Office of Audits, Office of Inspections and Program Evaluations, and Office of Systems Evaluation reviewed selected aspects of the address canvassing operation in the 2006 site test to determine the effectiveness of (1) efforts to automate address canvassing using handheld computers and associated systems; (2) methods for correcting the address lists and maps; (3) quality control processes; (4) outreach activities; and (5) address canvassing training and other aspects of the management, administrative, and logistical support for the 2006 test.

We conducted our review from June through December 2005 at bureau headquarters in Suitland, Maryland; the Denver, Colorado, regional office; and the two test sites—Travis County, Texas, and the Cheyenne River Reservation in South Dakota. Training for the 2006 test began in June 2005 and the listing ran from late July through mid-September 2005.

In preparing for our fieldwork, we reviewed the administrative, technical, training, and instruction manuals for the field offices, as well as partnership program materials, tribal liaison program training, and other documents. In addition, we interviewed the technical staff that developed the HHCs and related systems. We also studied pertinent census test and 2010 planning and decision memoranda that were issued as our work was in progress.

During our fieldwork, we attended portions of 19 training classes for field operations supervisors (FOSs), crew leaders, and listers. We sat in on 20 FOS meetings with crew leaders and crew leader meetings with their listers. We observed a total of 44 production and quality control listers performing address canvassing over a 4-week period at both test sites. We conducted interviews with headquarters, regional managers, all of the local office managers, and numerous field staff. We also reviewed reports that the local offices use to manage the operation. This extensive fieldwork helped us understand the challenges of address canvassing.

Upon completing our fieldwork, we conducted follow-up interviews with headquarters and regional officials to discuss matters such as canvassing procedures, quality control, automation, GPS, and HHC maps.

We recognize that the purpose of the 2006 test was to assess concepts, systems, and procedures for a reengineered 2010 census, and that some of the problems encountered may not be issues for future tests or the 2010 decennial (for example, systems tested were not prototypes of the final technical design). Nevertheless, the problems that surfaced during the test underscore the challenges faced by Census in conducting a thoroughly tested and smooth-running 2010 decennial census operation.

FINDINGS AND RECOMMENDATIONS

I. UNRELIABLE HANDHELD COMPUTERS INTERFERED WITH THE TEST

A key goal of our review was to identify issues with automation of address canvassing that would require attention in the test of nonresponse follow-up (scheduled for spring/summer 2006) and the Field Data Collection Automation contract to be awarded in March 2006. Census held its first site test of field automation in 2004, and at that time we concluded that handheld computers were a promising replacement for paper-based NRFU. However, numerous technical problems disrupted training and operations.⁹ For the 2006 test, the bureau resolved some of the major automation and technical support issues we identified: among other things, it added backup telecommunication servers at headquarters in case the primary servers failed, made it easier for HHC users to set up and monitor transmissions, sped up the HHCs' map display capability, and improved the quality of technical support.

But Census failed to adequately manage development of HHC functionalities needed to support address canvassing and encountered numerous problems—many of them similar to those we noted in 2004—that interfered with training and operations and introduced inaccuracies in the test results. In addition, one of the main reasons for testing the HHC was to refine requirements for the FDCA contract. We found that the bureau has not established a process for sharing lessons learned about automation with potential FDCA contractors or for incorporating revised requirements before contract award.

A. *HHCs Disrupted Training and Fieldwork, Corrupted Data, and Forced Rework*

Because of significant difficulties developing the HHC software, Census could not successfully complete each testing cycle. As a result, the bureau decided to delay the test by 1 month to further test and correct the software. Although serious problems remained, the bureau decided to proceed with address canvassing, with the goal of learning as much as possible about using HHCs for this operation.

Unfortunately, as in 2004, the HHCs suffered from frequent crashes, data loss, slow performance, and GPS difficulties. One indicator of the extent of problems was that the Travis County help desk received about five times the industry average number of calls for fielded systems.

The unreliable HHCs had a significant impact on canvassing operations. It appears that HHC problems were a major contributor to the two test sites failing to meet their production

Figure 2: Major Address Canvassing Functions of the HHC

- Managing work assignments
- Updating address records
- Annotating maps with address location
- Processing quality control and delete verification data
- Handling data flow between the lister and Census headquarters for updating addresses, providing quality control, and verifying address deletions

⁹ U.S. Department of Commerce Office of Inspector General, Spring 2002. *Improving Our Measure of America: What Census 2000 Can Teach Us in Planning for 2010*, OIG-14431. Washington, D.C.: Department of Commerce OIG.

goals. Neither Travis County nor the Cheyenne River Reservation finished work at the scheduled end of address canvassing (September 2)—Cheyenne River was only 68 percent complete and Travis County was 90 percent finished. By extending the operation for 10 days to make the address list as complete as possible for 2006 test operations that follow, Travis County was able to complete 98 percent and Cheyenne River 89 percent of their assignment areas.

Census tried to minimize potential disruptions that faulty HHCs could cause by increasing technical support. In Travis County two extra crew leader assistants and a technical assistant were assigned to each training location and two additional technical assistants were assigned to the LCO. The Cheyenne River Reservation office received one additional technical assistant. These extra personnel were for the most part reassigned from headquarters—an option that will not be feasible during the actual census, when approximately 500 LCOs and thousands of training centers will be operational. In the end, additional staff at the test sites could not compensate for the inherent weaknesses and attendant problems in the HHC system, such as the following:

- **Lost and inaccurate data.** To eliminate a problem that plagued the 2004 test, Census designed the HHC to prevent data loss if the system crashed and to let listers restart crashed units in the field rather than having to return to the local office to obtain assistance. But this functionality did not work in some situations, especially during the quality control process, where HHCs crashed frequently and a significant amount of data was lost. Listers in Cheyenne River had to recanvass 25 assignment areas (13 percent of the total) to recover lost data. The Travis County office also suffered an undetermined amount of losses that required recanvassing. Even a single loss could be significant depending on the size of the census block. For example, in Travis County an HHC crashed and lost the data collected for a large block—a total of 900 addresses. The lister had to recanvass them all.

Also, the HHC sometimes inaccurately counted various lister actions—for example, whether a lister verified, corrected, deleted, or added addresses, and the number of successful and failed attempts to use GPS to capture coordinates. Managers relied on reports containing these erroneous counts. These inaccuracies raise concerns about the reliability of other data collected by the HHC and could negatively affect analysis of test results and updates to the address list.

- **Slow operations.** The bureau also designed the HHC to work faster than it had in 2004, particularly in moving maps and data to and from internal memory. However, in certain circumstances the HHC continued to operate slowly, particularly when moving from function to function. We observed it taking minutes instead of seconds to open or return to the address list, especially when it contained many records; move from the data collection function to the assignment management function; and to activate the GPS utility. Slow performance made it more difficult for listers to follow procedures and complete assignments. For example, one lister resorted to collecting data on paper and told us he would later enter the data into the HHC at home.

B. Problems With Coordinate Collection Leave Questions About Use Of GPS Unanswered

The handheld computer's GPS receiver, which features a "you-are-here" indicator on the HHC map, helps listers navigate their assignment areas and for each structure containing one or more addresses, collect its latitude and longitude coordinates. The bureau believes GPS will help reduce decennial costs by enabling listers to find addresses more quickly and improve accuracy of the master address file by assigning addresses to their correct census block and eliminating duplicates. The bureau first tested coordinate collection in the 2004 site test of nonresponse follow-up and found that field staff frequently did not collect coordinates because of problems with the HHCs or physical obstructions to the GPS signal (e.g., tall buildings or heavy tree cover). Although the test procedures in 2004 instructed listers to always obtain coordinates, we also learned they sometimes simply chose not to collect GPS data. For the 2006 test, Census programmed the HHC to make coordinate collection a mandatory step for listers and added a feature allowing them to zoom in on the HHC map and select a position on the map to place a spot if the GPS you-are-here indicator was not working.¹⁰

When the GPS function on the HHC worked, listers found the you-are-here indicator a valuable navigation tool, especially in unmapped areas, such as remote portions of the Cheyenne River Reservation and new housing developments in Travis County. But the GPS function worked only intermittently and was often slow to activate. According to the bureau, test results suggest that the coordinate collection software on the HHCs may have incorrectly calculated address coordinates and caused slow GPS performance. These problems, in conjunction with the HHC reliability problems, left important questions about coordinate collection unanswered. For example, the bureau cannot adequately determine what obstacles prevent listers from using GPS to collect coordinates, whether listers can follow coordinate collection procedures, and whether collected coordinates are accurate. If Census wants to continue with its plan to capture GPS coordinates for the decennial, problems with the GPS software need to be fixed and the system must be operationally tested to see whether performance and procedural requirements are met.

C. Inadequate Development of HHC Software Diminished Value of Test

Over the past 8 years, our office¹¹ and the Government Accountability Office (GAO) have reported extensively on the bureau's inadequate approach to software development. Although Census began to improve this process in 2002 and has made some progress,¹² it clearly needs to continue to focus on this area. Inadequate software development is at the heart of the HHC problems noted in the 2006 test: the bureau's inability to field reliable handheld computers delayed the start of address canvassing and rendered the HHC less capable than planned—for example, the devices lacked the capability to add missing streets to HHC maps, an important function in a rapidly growing area such as Travis County. Census acknowledged that it lacked sufficient in-house expertise to develop some of the HHC software. In the future, Census should

¹⁰ Annotating the location of an address on the HHC map is called "map spotting."

¹¹ See the Office of Inspector General's reports listed on page 4.

¹² U.S. Government Accountability Office, June 2005. *Census Bureau Has Implemented Many Key Practices, but Additional Actions Are Needed*, GAO-05-661. Washington, D.C.: GAO.

consider alternatives to in-house development before undertaking projects it might not have the expertise to tackle.

The poorly performing HHCs distracted listers in training classes. Also, portions of some of the manuals used during training were outdated because of the last minute changes made to the HHC. For example, in one class we observed new material issued midway through training creating difficulties for the trainer. Unreliable HHCs shook local staff's confidence in the quality control data collected (see chapter III for details). They made it more difficult to evaluate the effectiveness of the quality control process, accurately predict production levels for listers, and identify lessons learned. The HHC problems shifted the bureau's focus from the real purpose of the test, which was to explore improvements to automation and related procedures, such as how to more fully utilize HHCs to aid listers in following procedures or to streamline data collection. Instead, Census had to concentrate on just making the HHC work so that it could complete the address canvassing operation. (Appendix A presents our suggestions for enhancing HHC functionality.)

D. Census Needs a Plan and Process for Conveying Final HHC Requirements to Potential FDCA Contractors

A major purpose of the 2006 site test is to identify lessons learned in automating key Census operations in order to refine the requirements for the Field Data Collection Automation contract. The handheld computer is FDCA's key technology component. As part of the source selection process, contractors built HHC prototypes that have basic address canvassing capabilities. The prototypes were completed in December 2005 and the contract is to be awarded by March 31, 2006. Census believes that requiring prototypes as part of the contract award process increases the likelihood of having a working system in place by the start of dress rehearsal address canvassing, which begins in April 2007. The chosen contractor will have to make needed changes to the prototype in the year between contract award and April 2007.

Figure 3: Schedule of FDCA activities related to dress rehearsal address canvassing

SEP – DEC '05	JAN – MAR '06	31 MAR '06	APR'06 – MAR '07	APR '07
Build Address Canvassing Prototype	Test & Evaluate Prototype	Award FDCA Contract	Develop & Deploy Dress Rehearsal Systems	Start Dress Rehearsal Address Canvassing Operation

Source: Census

As late as September 2005, the bureau had not developed a process for systematically identifying relevant information gleaned from the test that could affect FDCA and for incorporating related requirements changes into the FDCA contract. Although the basic tasks of address canvassing are not expected to change, the test provided valuable insights for improving address canvassing procedures, as well as for presenting information on the HHC, both of which could affect FDCA requirements. For example, a cross-organizational team is examining quality control data to determine the kinds of mistakes production listers made that caused their assignment areas to fail. Census may use results from this assessment to improve address canvassing procedures, which could necessitate changes to existing FDCA requirements. Similarly, observers of the test

from within and outside the bureau identified numerous opportunities for enhancing the HHCs support of field procedures (see appendix A).

In December, bureau officials stated that they planned to complete and document their assessment of the address canvassing operation by the end of January 2006, but were still discussing the best process for transferring relevant 2006 test information to the FDCA program management office, for inclusion in the contract. However, time is running out for the bureau to be able to competitively negotiate the cost of these changes before contract award.

Nonresponse follow-up. As with address canvassing, the bureau needs to convey refined requirements for nonresponse follow-up automation for inclusion in the FDCA contract as soon as possible after concluding this test operation (scheduled for April through July 2006 in Travis County). After the 2004 site test, the bureau took over a year to issue a series of final reports on HHC functionalities and needed enhancements. The upcoming test of nonresponse follow-up will evaluate new or improved functionalities, such as managing enumerator workload and payroll. The bureau needs to reexamine its evaluation schedules to make sure it can identify refined NRFU requirements and incorporate them into the FDCA contract early enough to avoid rework and enhance the likelihood that dress rehearsal systems meet Census's needs.

RECOMMENDATIONS

The Census Bureau director should direct appropriate management officials to take the following actions:

1. Enhance the reliability of automation in future tests and operational programs by
 - a. continuing to improve system development practices and
 - b. using contractors to fill any staffing gaps or, when warranted, to handle system development.
2. Develop an adequate HHC capability for collecting address coordinates by
 - a. determining the factors that affect the reliability of GPS and accuracy of address coordinate collection, and
 - b. developing a plan for implementing and testing improvements so that this capability effectively supports decennial operations.
3. Ensure that the FDCA contract appropriately addresses automation issues identified in the 2006 test. These include system reliability, performance, and usability; GPS processing; and HHC street mapping capabilities.
4. Establish a process for timely analysis of test results and incorporating resulting requirements changes for address canvassing and nonresponse follow-up into the FDCA contract. If possible, incorporate changes to address canvassing requirements before contract award.



Synopsis of Census's Response

In its response, Census stated that it does not agree that the unreliable hand-held computers interfered with the 2006 test of address canvassing. Rather, the bureau stated that the handheld computers were the test. The bureau maintained that it was testing the feasibility of the concept of automating the address canvassing operation. While acknowledging that originally it had some other test and research objectives, the bureau stated that it just needed to “get through a dramatically re-envisioned operation.” While Census noted that it did not mean to minimize the problems it had with creating an automated operation, it maintained that reaching certain production numbers and receiving updates for all areas was not the real objective.

The bureau was concerned that our draft report's reference to a “lengthy testing program” made it appear that Census had a robust testing program. In fact, Census asserted it had difficulty developing the automated systems for address canvassing. The bureau implemented many tests in a 9-month period because it was unable to successfully resolve software problems. Also, the bureau clarified that intermittent GPS availability, slow GPS performance, and inaccurately calculated GPS coordinates on the HHC were caused by problems with the bureau-developed GPS software and were not due to shortcomings in the GPS signal or hardware.

Further, Census said its decision to outsource to industry the development of both the hardware and software was based in part on the challenges and issues the bureau experienced in developing the automated systems for the 2004 and 2006 tests. The bureau goes on to say that 2006 test experiences are being summarized in the form of requirements for use by the FDCA contractor, and that 2006 test development teams are prepared to work with the contractor and other Census divisions on final HHC requirements if needed. It also noted that as part of its acquisition strategy for FDCA, the competing vendors developed address canvassing prototypes, which have demonstrated that HHCs are feasible for address canvassing operations without a large Census Bureau investment.

In its response, Census did not agree nor disagree with the recommendations in this section.

OIG Comments

We stand by our finding that the unreliable HHCs interfered with the 2006 address canvassing operation and consequently diminished what the bureau could learn from the test. During our firsthand observations of training classes, we saw training suffer as listers became distracted by their malfunctioning HHCs, and failed to pay attention to the address listing procedures being taught. We also saw slow performance and HHC crashes make it more difficult for listers to follow procedures and complete assignments in the field.

The test objectives documented in the *Census 2006 Test Project Management Plan* laid out higher aspirations than to “get through a dramatically re-envisioned operation.” The plan

described research questions that, if answered, would provide essential information for 2010 census planning—including the degree to which automation reduces the time required to collect and process the address canvassing data, whether GPS is a sufficiently accurate method for collecting coordinates, and whether automation improves the quality of the collected data. However, the poorly performing HHCs prevented the bureau from answering these questions. We strongly agree that contracting for field automation was a prudent decision. That the bureau believes the address canvassing prototypes developed by the competing vendors demonstrated the feasibility of address canvassing is also a positive development. It remains unclear, however, on what basis time and resource estimates for using HHCs to conduct address canvassing in the 2010 census are being made.

In addition, if the HHCs had worked well, the bureau would have obtained better information for defining address canvassing system and operational requirements for the FDCA contractor. At the time of our January 2006 exit conference, the limited information from the 2006 test experience was still being summarized by Census, and the process for transferring lessons learned to the FDCA contract remained to be identified. It should be noted that the FDCA contract was awarded March 30, 2006; thus the opportunity to incorporate meaningful changes from address canvassing into FDCA before contract award has passed.

II. MAP ERRORS AND INADEQUATE PROCEDURES FURTHER COMPLICATED ADDRESS CANVASSING

The 2006 test provided the opportunity to assess the accuracy of TIGER maps installed on the handheld computers, their success at guiding listers to specific addresses, and the ease with which listers could modify maps and addresses to match what they encountered on the ground. Census updated the maps initially installed on the HHCs from data provided by a contractor who aligned streets with their true GPS location using local information on roads, railways, and waterways from community and government organizations (among others).

A *block* is the smallest geographic area for which the bureau collects decennial information. Blocks are bounded mainly by roads, but may have other features as their borders, such as streams and county lines. The bureau divides the nation into some 8 million blocks, and builds address canvassing assignment areas from groups of blocks adjacent to one another.

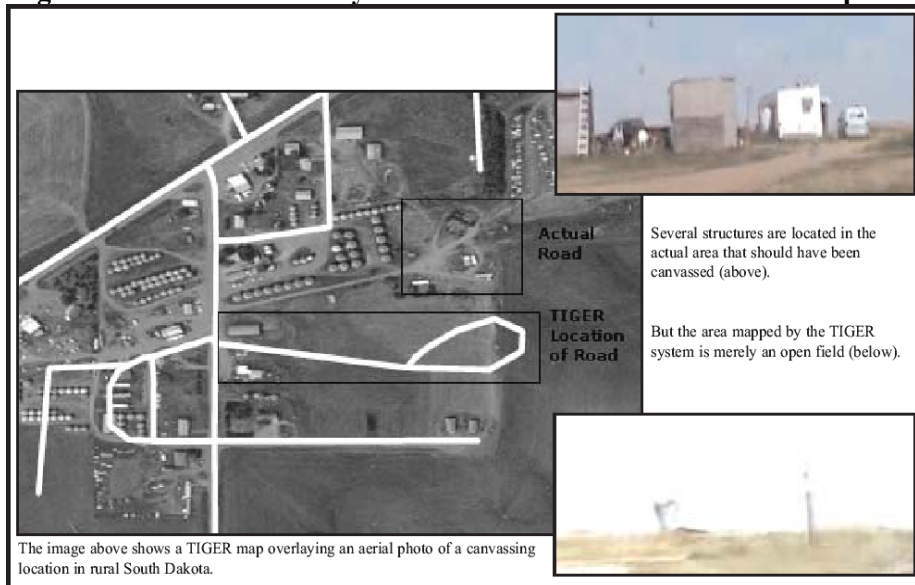
Test Site	Blocks	Assignment Areas
Travis County	4,867	1,076
Cheyenne River	1,386	199
Total	6,253	1,275

Source: Census

Using the handheld computer's GPS you-are-here function, listers canvassed clockwise along the border of each block (see box). The address canvassing instruction manual provides specific procedures for listers to follow when they encounter certain situations. For example, when a block border is a stream, railroad track, or something other than a road, listers are to look along the border for any living quarters not accessible from a street or road. If they cannot determine whether living quarters exist, they are to ask a knowledgeable person, such as a postal carrier or someone who lives nearby.

In some areas, we found that the listers' ability to use the GPS you-are-here function and update addresses was hampered by erroneous maps on the HHCs and ambiguous instructions on how to handle problems they encountered.

Figure 4: Block bordered by an unnamed road not accurate on map



Sources: Census TIGER map, USDA Aerial imagery, OIG photos

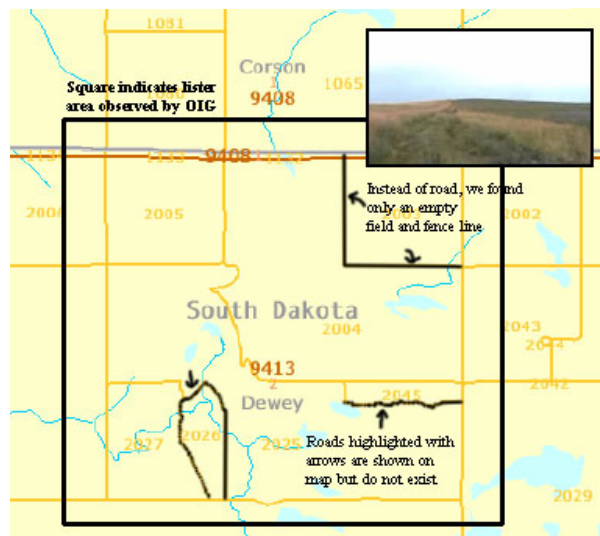
A. Map Errors Made It Difficult for Listers to Complete Assignments

The HHC maps accurately represented most areas of the test sites but contained nonexistent or misplaced roads, which caused problems in 10 of the 46 canvassing efforts we observed: listers in these instances spent excessive time trying to locate their routes and often did not fully canvass their assignment area, may have missed housing units, and failed to correct maps.

At the **Cheyenne River site**, for example,

- One lister could not find a block that contained several structures because it was bordered by an unnamed road not accurately represented on the HHC map. As a result, the GPS you-are-here function indicated, in error, that the block was in the middle of an empty field. The lister did not delete the misplaced road from the map and did not canvass the actual location. (See figure 4 above.)
- Another lister was able to travel only 2½ sides of a square-mile block because the remaining borders were not roads, though they were shown as such on the HHC map. The hilly terrain prevented the lister from visually canvassing the remaining 1½ sides of the block for any living quarters. The lister did not remove the nonexistent roads from the map. (See figure 5.)
- In a 3-block assignment area, while following the GPS you-are-here indicator along roads on the HHC, a lister drove off-road through a field of clover for one block and through several miles of pasture for a second. The lister could not complete the assignment because roads shown on the map did not exist and fences obstructed passage. This lister also did not correct the map.

Figure 5: Maps showed nonexistent roads



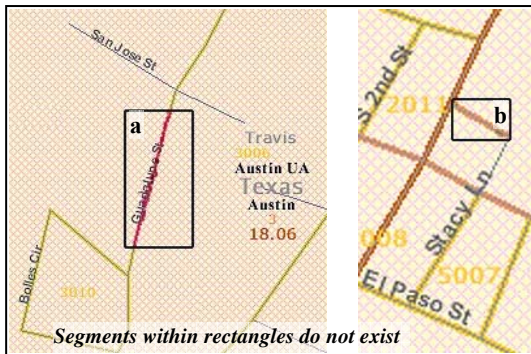
Sources: American FactFinder map, OIG photo

We later learned from bureau officials that the TIGER database contained roads for which the contractor aligning them had received no current data. After reviewing aboveground images, Census determined that nearly all of these nonaligned roads do not exist. It plans to develop software to eliminate nonexistent roads for the dress rehearsal sites. However, the bureau does not yet have a complete plan for identifying nonexistent roads throughout the nation and needs to develop one to improve the accuracy of HHC maps used in decennial operations.

In **Travis County**, a quality control lister was able to check housing units along only two sides of a block shown as having four sides on the HHC map, because the remaining two sides did not exist. Then, instead of following procedure and continuing the check at the next available housing unit in her assignment area, the lister drove to another area on the map to check other units on her list. This departure from procedure put the validity of this quality control

assignment in doubt because she worked from her list rather than reviewing successive housing units on the ground.

Figure 6: Incorrect Travis maps



Source: American FactFinder

Listers told us of other city streets that were misrepresented on the maps that nevertheless were not corrected. In one example, two pieces of a noncontiguous street were connected. (See figure 6a.) In another, two parallel streets were shown as connecting. (See figure 6b.) As in rural areas, listers did not correct maps consistently, and the errors caused confusion, making it difficult to follow procedures and wasting time.

Even with improvements, maps may still contain nonexistent roads, and the bureau needs to emphasize to listers that they should delete nonexistent roads. According to bureau data, listers did delete more than 80 nonexistent roads in Travis County and 9 such roads on the Cheyenne River Reservation. Yet in some cases these roads crossed multiple blocks and assignment areas where they were deleted from some—but not all—of the blocks. Consequently, some erroneous road segments still remained on the maps. (See figure 7.) Also, only 2 of the deleted roads in Travis County matched the nonexistent roads we observed. Another 16 that we identified in both sites combined remained in the database.

Figure 7: Erroneous road segments remain on map



Sources: TIGER map, CAPCOG imagery

B. Ambiguous and Incomplete Procedures Compromised Listers' Ability to Revise Address Lists

The address lists in the handheld computers contained most residences in the test sites. Listers had to identify and add addresses for any living quarters not on the lists—for example, new quarters created since the list was last updated or locations attached to a garage or hidden in a commercial building—and delete any addresses they determined did not exist. Listers were to obtain GPS readings to place addresses in the correct location on the maps and interview an occupant of every structure to get complete address information (including mailing addresses that differed from the unit's physical location, such as post office boxes).

The U.S. Postal Service delivers mail to houses in Travis County but more typically to P.O. boxes on the Cheyenne River Reservation. Most Travis County housing units have clearly posted address numbers. Living quarters on the reservation frequently have no numbers and most roads lack street signs; the address list identified many housing units by their physical description. In both sites, listers had difficulty following the bureau's canvassing procedures. Among the problems we noted were the following:

- **Incorrect addresses and living quarters additions and deletions.** Many housing units on the Cheyenne River Reservation were in areas that lacked infrastructure such as paved roads and clearly defined property boundaries (see figure 8), and some listers added structures unlikely to be living quarters while missing others that should have been included. In Travis County, listers were supposed to simply verify addresses for unoccupied trailer lots or pads in mobile home parks. However, in some instances we observed that they incorrectly deleted addresses for empty lots or pads. The bureau's instructions for handling these situations seemed clear, but some listers still failed to take the correct action.

Figure 8. CRR housing units



Source: OIG

Some listers did not know how to handle vacant lots located elsewhere in the community. On the reservation, some listers deleted locations that did not have an explicit address but that obviously had a trailer in the past and could easily have one again. In Travis, a lister recorded an empty lot with an address as uninhabitable. The bureau's instruction manual stated that the delete action is only for addresses that cannot be found on the ground and failed to clearly define how to handle such cases. Census needs to clarify how to handle a greater variety of special situations and unusual local conditions, particularly for canvassing in rural communities. The bureau could equip the HHC with reminders or checklists to safeguard against such errors.

- **Improvised procedures.** Listers sometimes devised their own, often incomplete, approaches for interviewing occupants and, as a result, failed to obtain valuable address information. For example, on the Cheyenne River Reservation, listers did not consistently ask for a house number and street name. In both sites, they rarely asked whether there were additional living quarters on the property. The listers were encouraged to work during the day when many people were not home, compromising the listers' ability to get an interview. Further, on the reservation, where most people received their mail via P.O. boxes, listers could not obtain mailing address information if no one was home. In these cases, listers entered on the HHC that the mailing address was different from the location address, but had to update the mailing address before they could move on to the next housing unit. The procedure did not cover what to do when this information was lacking, which caused listers to improvise by entering "n/a" in the P.O. box field. The bureau needs to detail the procedure on what to do when a different mailing address cannot be obtained.
- **Inadequate guidance.**
 - **Map Spots.** The procedure for manually placing map spots on the handheld computer without the benefit of GPS is not detailed enough for listers to get

consistently correct results. For example, a Travis County lister placed map spots in a trailer park without GPS until it became available; then, the you-are-here indicator showed that the map spots were so far off that she redid them with GPS. When the GPS signal was not available, some listers would go home rather than finish canvassing a block or assignment area. Providing handheld computer capabilities such as automatic zooming and displaying the distance from the map spot to block edges or other features could assist in producing more accurate map spots.

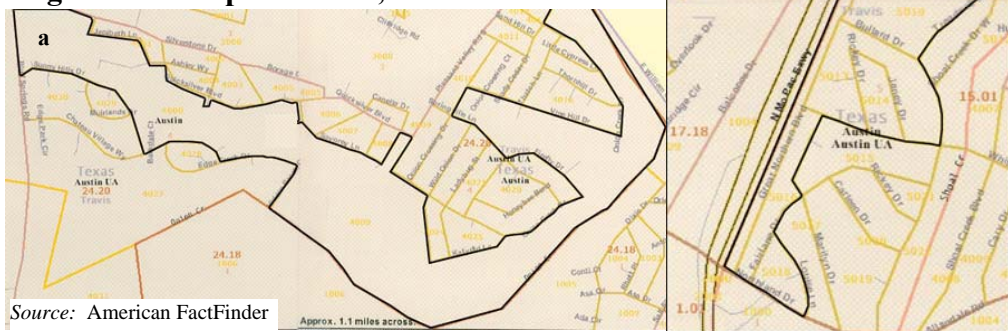
E-911 Addresses. Rural areas across the nation (including the Cheyenne River Reservation) have begun assigning E-911 addresses to residences to improve response during emergencies. When E-911 addresses differ from a living quarters' posted address, listers were required to collect the E-911 address. Collecting emergency addresses was covered in lister training and in the instruction manual, but the interview procedure did not explicitly direct listers to ask residents for an E-911 address, nor did the listers we observed in either site do this. Capturing a different posted address or description as well would help staff in the update/enumerate and nonresponse follow-up operations locate the correct housing unit. The handheld computer could be programmed to prompt the lister to request the E-911 address during the interview and also record a different posted address or description.

C. Identifying Complex Blocks Would Facilitate Address Canvassing

Some assignment areas contained blocks with boundaries that were impassible, such as streams, major highways, or railroad tracks. (See figure 9a.) Other blocks comprised multiple physical blocks¹³ that could not be covered by simply traveling clockwise, creating a situation not discussed in training or the listers' manual. (See figure 9b.)

Following canvassing procedures for such complex blocks is difficult, and the likelihood of missing housing units or making mistakes increases. We observed one lister canvassing a block that contained parts of several

Figure 9: Complex blocks, outlined in black



¹³ The bureau's Geography Division uses automated rules to select physical and invisible features, based on predetermined specifications, to determine Census block boundaries.

neighborhoods edged by a stream. She had to canvass the block in several sections and, in an attempt to finish it within schedule, began traversing it counterclockwise, rather than clockwise as required. Another lister told us that the block she was canvassing, composed of several physical blocks, had originally been assigned to a different lister who quit because the block was so complicated.

To minimize the difficulty of canvassing such areas, the bureau could (1) program the HHC to show the best starting point and to guide listers along the best paths, (2) flag complex blocks that may contain invisible boundaries, barriers, or multiple physical blocks to enable local field office staff to assign these areas to more experienced listers and to help them plan a canvassing route, and (3) review the block formation process and reduce block complexity where possible.

D. Reducing Cost of Questionnaire Delivery Was Not Tested

The bureau's methodology for counting people relies on each census questionnaire being completed by a specific household in a known location. To accomplish this in Census 2000, the post office delivered the census questionnaire, at a bulk rate, to over 90 million housing units with city-style addresses that the bureau was certain would receive their mail at home. The bureau hand delivered the questionnaires to the remaining 20 million-plus housing units assumed to be in areas too rural for adequate postal delivery, at a total cost of \$130 million or \$5.53 per housing unit.

The bureau's Census 2000 evaluations indicated that 9.5 million¹⁴ residences that received hand-delivered questionnaires could have received them through routine mail delivery. Given the potential for saving tens of millions of dollars, the evaluations recommended researching the use of post office questionnaire delivery, especially outside cities in the Southeast and Midwest and in entire states such as Iowa, Wisconsin, Michigan, Ohio, North Carolina, and Virginia.

The bureau needs to determine what addresses are sufficiently clustered to shift bureau delivery of questionnaires to postal service delivery before the 2010 census because they involve systems and procedures that could cause some people not to receive a questionnaire or to receive more than one. If such areas can be identified, they should be included in the 2008 dress rehearsal.

Research would lead to methods for identifying other places where the post office can deliver census questionnaires by:

- **Finding bureau delivery areas with sufficient postal service address data.** The bureau routinely updates its master address file from Postal Service files. Since Census 2000, the bureau has started labeling blocks as containing only, some, or no postal

¹⁴ In evaluating Census 2000, the bureau reported that 22 million housing units were listed in the address listing operation, all of which would receive hand-delivered questionnaires. The bureau also reported that approximately 43 percent of these were also on an early postal service address file. From this information, we calculated that 9.5 million residences were capable of receiving the questionnaire by mail. See U.S. Census Bureau, January 2002. *The Address Listing Operation and Its Impact on the Master Address File*, Census 2000 Evaluation F.2. Washington, D.C.: Census Bureau.

service addresses. The bureau needs to study how this block characterization could be used to find areas with sufficient postal data to potentially shift from bureau to postal delivery.

- **Strengthening address canvassing procedures to collect all city-style addresses.** Although address canvassing procedures in the 2006 test had listers indicate whether the mailing and location addresses were the same, it did not emphasize collecting city-style address in rural areas. To expand postal delivery, the bureau needs to require that listers collect city-style addresses in areas where the bureau previously delivered the questionnaire. This would allow the bureau to recognize where the post office delivers.
- **Determining how the size of areas with different delivery methods affects efficiency.** The bureau has said that, for efficiency, single blocks or small areas of bureau and postal questionnaire delivery should be avoided. Therefore the bureau needs to determine the smallest size a canvassing and enumeration area can be for procedures to remain efficient.

The dress rehearsal is the only remaining operational testing opportunity before 2010. The bureau recently tasked a working group to review different enumeration methods, including approaches for increasing postal delivery. The bureau will need to sufficiently test methods it intends to use for determining new postal delivery areas during dress rehearsal.

RECOMMENDATIONS

The Census Bureau director should direct appropriate management officials to take the following actions:

1. Determine why the TIGER database contains nonexistent roads and develop approaches to eliminate such roads nationwide from the database by the 2010 census.
2. Refine lister training to provide clear and effective instruction on when and how to correct maps and adjust routes.
3. Provide computer prompts to aid listers in following procedures for deleting addresses, obtaining complete address information during the interview process, placing precise map spots, and canvassing complex blocks efficiently.
4. Develop and implement a mechanism for alerting local Census officials about assignment areas that may be difficult to canvass.
5. Review the block formation process and reduce block complexity where possible.
6. Determine what addresses are sufficiently clustered to shift bureau delivery of questionnaires to postal service delivery, and include such areas as trials in the 2008 dress rehearsal.



Synopsis of Census's Response

In its response to our draft report, the Census Bureau generally concurred with the finding and recommendations in this section and, in some instances, provided actions to be taken. For the first recommendation, the bureau stated that nonexistent roads exist due to the various sources used to update the database over the years. Census noted that the address canvassing operation for the 2010 census will be the mechanism used to identify and flag for deletion any nonexistent roads currently in TIGER. For the second recommendation, the bureau agreed the lister training should provide clear instruction, but stated that the capability to update maps was not implemented on the HHC for the 2006 test, and that listers were not trained on this function. The bureau agreed with, or agreed to consider, the remainder of the recommendations, although in response to our recommendation to develop and test methods for identifying additional areas for post office questionnaire delivery, Census indicated that it may be possible to use the 2010 address canvassing operation to capture the data needed. The bureau noted that just because a structure has a street name and house number does not necessarily mean the post office recognizes and uses the address for mail delivery. It also stated that it is not operationally feasible to mix postal service delivery and Census hand-delivery in the same block or ZIP code. An interdivisional team within the Census Bureau is examining this issue.

The bureau made several other specific comments about this finding in its response. With respect to Figure 4 (page 13), the bureau stated that the road apparently was not realigned and that unambiguous procedures for handling such situations are probably needed. It also stated that the realigned TIGER is fixing many such problems. However, the bureau questioned how having GPS coordinates made mapping issues worse. The bureau also thought our draft report reflected confusion between assignment areas and blocks. It stated that Census does not create blocks, that a block cannot be composed of multiple blocks, and that the bureau does not have a block formation process or have anything to do with block complexity. We disagree, as explained in more detail below under the recommendation 5 discussion. Finally, the bureau found our conclusion about a Census 2000 evaluation finding that 9.5 million addresses that received hand-delivered questionnaires could have received them through routine mail delivery was misleading because it does not take into account the fact that these addresses are not necessarily clustered. It questioned whether splitting the response for delivering census forms would be the best way to conduct the census for a block with mixed mail and hand-delivery.

OIG Comments

As we stated in the above synopsis, Census said that the address canvassing will be the primary mechanism used to identify and flag for deletion any nonexistent roads. However, we suggest that prior to the address canvassing operation, the bureau implement an automated process to eliminate some of the nonexistent roads, which could reduce some of the time-wasting confusion during the costly address canvassing operation. Specifically, the automated block formation process could (a) change the designation of some boundary features that have historically been

erroneously labeled as roads, (b) remove planned but as-yet unbuilt roads as boundaries, and (c) improve the rules for connecting roads.

According to Geography Division officials with whom we shared our observations, certain block boundaries, particularly in rural areas, may have been erroneously designated as a road because they appeared as roads in the original sources used to update the maps; however, these roads may not have appeared in the recent sources used to improve map accuracy. Consequently, the automated block formation process, which is discussed in more detail below, could remove features such as unimproved roads and fence lines from consideration as block boundaries, as they serve as poor block boundaries and ultimately hamper the operation. In addition, as a result of the recent work to improve map accuracy, roads that are planned but not yet built are found in growing urban areas. The bureau does not consider future potential roads as errors and adds them to the map database. We believe the bureau should explore the feasibility of screening out planned roads during the automated block formation process as well as improve the procedures for identifying them during the address canvassing operation. Finally, the rules for connecting roads should be reviewed, as we identified instances where seemingly contiguous blocks contained nonexistent connecting roads.

We also take exception to the bureau's assertion that the capability to update maps was not implemented on the HHC for the 2006 test, and that listers were not trained on this. While it is true that problems with the handheld computer necessitated dropping the ability to add roads, listers were in fact taught, during a 45-minute lesson plan on the third day of training, how to select a street, correct a street name, delete a street, and restore a deleted street. In addition, as we report on page 23, some streets were deleted, thereby substantiating that some listers understood and followed the training instructions. With respect to Figure 4, the purpose of that illustration was to show an unaligned street and to demonstrate lister reliance on the GPS navigation instrument, rather than ground observation. Such map errors will occur, and listers must be adequately trained to recognize and correct errors and, equally important, to adjust their route when it does not correspond exactly with the GPS navigation instrument.

We also disagree with the statement made in its response that Census "does not create blocks." We note that the bureau agreed with recommendation 5, to review the block formation process and reduce block complexity. This recommendation is directed towards improving the predetermined specifications and criteria used to automatically create blocks. The bureau's Geography Division uses rules, based on predetermined specifications, to establish Census block boundaries. A block must meet specific criteria (size, shape, and boundary feature type) to qualify as a block. In the event the block does not meet the predetermined standards, additional prioritized criteria are used to merge adjacent areas to produce a qualifying block. It is this type of merging that can potentially create what we describe as "a block composed of multiple blocks." Moreover, it is this block formation process and resulting complexity that we believe should be minimized, and to the extent that complex blocks will occur, new procedures and training put in place.

We also recommended that the bureau develop and test methods for identifying additional areas for post office questionnaire delivery, and include such areas as trials in the 2008 dress rehearsal.

Because, as the bureau's response points out, changing the questionnaire delivery from bureau to postal delivery is so much more complex than simply matching bureau and postal addresses, strategies to reduce questionnaire delivery costs should be tested in advance and not implemented for the first time in the decennial.

III. NEW VERIFICATION PROCESS APPEARS FEASIBLE, BUT QUALITY CONTROL TRAINING AND INFORMATION SHARING NEED IMPROVEMENT

To ensure a 97 percent accuracy rate for address canvassing, the bureau conducted a quality control field check of every assignment area after the initial canvassing.¹⁵ In 2000, a similar dependent quality control (DQC) operation was performed, except that the same staff conducted both the initial listing and the quality check. For the 2006 test, a separate staff of listers was hired and trained for the quality control function. In DQC, a quality control lister compares what he or she observes to a random portion of the production lister's work. If a certain number or type of error occurs, then someone other than the original production lister recanvasses the entire assignment area.

In addition to performing its typical DQC review, the bureau is testing, for the first time, having a quality control lister check all housing unit deletions and house number changes made by the production lister. All housing unit deletions undergo a second, on-the-ground inspection to determine if the housing unit should be removed from the master address file. The bureau wants to avoid incorrectly eliminating and thus not enumerating a housing unit. In the past, this delete verification procedure occurred in later operations, such as nonresponse follow-up. However, automation allows deletions and housing number changes made during production listing to be quickly reviewed to confirm the changes concurrently with the quality control review.

Census believes that verifying deletions and changes during the same operation will improve the quality of the address list and therefore reduce enumeration inaccuracies. Because fewer questionnaires will be sent to nonexistent or duplicate addresses, the nonresponse follow-up workload and costs should be reduced.

QC listers perform the quality control review using the handheld computer. QC listers select the assignment area to be checked, open the block, and canvass a sample of addresses (see footnote 15) beginning at an automatically generated random starting place as well as any other address records flagged for verification. Once complete, the software generates the decision to pass or fail the assignment. Failed assignment areas were recanvassed. Census prepared a management report that provided feedback to local staff on lister errors. LCO staff were to retrain or terminate listers as necessary. The end result was to be a more accurate operation and address list.

Despite technical problems with the HHCs, quality control listers were able to successfully verify address deletions and house number changes during the address canvassing operation. But weaknesses in training and management reporting, as well as the bureau's failure to analyze QC data during the operation, undercut the overall success of the quality control process.

¹⁵ To achieve this level of accuracy, listers were given a random starting point and canvassed 12 consecutive housing units in Travis County and 8 at the Cheyenne River test site for each assignment area.

A. Quality Control Training Does Not Sufficiently Prepare QC Listers

The time allotted for training quality control staff for address canvassing appeared insufficient to adequately prepare them for all aspects of the QC process. The bureau developed the roughly 30-hour class for quality control listers by adding a 3-hour QC segment to the end of the production lister training curriculum. After training QC crew leaders and assistants, local Census staff at both test sites realized that teaching QC listers their specific duties required more than 3 hours. The Travis County LCO doubled the QC-specific instruction to 6 hours and increased total training time by about 10 hours.¹⁶

Even with the additional time, instructors in Travis County rushed to complete the classes on schedule, sometimes could not answer trainees' questions because of time constraints, and skipped over the lesson on misplaced map spots, suggesting that trainees review this information on their own. Instructors could not give trainees the benefit of simulating a QC lister exercise in the field, as was done in the production lister training class. In the end, QC listers said they felt unprepared and confused after training.

The crew leaders and crew leader assistants who taught the quality control lister class had only received their training 1 week earlier. They reported feeling they initially knew the material, but once they began instructing the class, they were confused and had difficulty explaining the material. We observed that at times instructors gave different or conflicting answers to the same questions asked by trainees.

The bureau needs to consider alternative training approaches for QC listers. For example, rather than covering all production lister duties and briefly addressing QC lister responsibilities at the end of the class, Census could develop a shorter, succinct lesson on the essential points of production listing that QC listers need to know to do their jobs. Or quality control responsibilities could be integrated throughout the training. If the bureau deems that QC listers need to be taught all production lister duties, it could recruit QC listers from the pool of production listers—who are already well-versed in production duties—and give them separate training that covers only quality control. Finally, as addressed in more detail in chapter V, the bureau should consider enhancing its verbatim training approach with visual aids and other instructional devices to promote greater comprehension of the material (see page 35).

B. Poor Communication and Inadequate Management Reports Weakened Quality Control

When an assignment area failed the quality control check, local census office staff had only two sources of information as to why: the QC Check Status Report (DD-959) and communication with headquarters. Both of these were inadequate in the 2006 test, leaving LCO staff unable to

¹⁶ This was observed by OIG and reported by local Census officials at the Travis County test site. We did not observe QC lister training at the Cheyenne River Reservation, but local Census officials told us they thought more time should be allotted to the training and that QC duties should be integrated throughout the training, not just addressed at the end.

determine whether the failures were due to lister error or software errors, such as the GPS software causing map errors or post office box edits incorrectly programmed as edit errors.

The QC Check Status Report, which was to be given to the quality control and production managers at least twice a week, was intended to collect information to evaluate address canvassing. The report did not provide sufficient detail to explain why an assignment area failed. It simply listed four major categories of quality control failures—map errors, omission errors, action code errors, and editing errors¹⁷—but provided no analytical or other data to enable managers to understand why the problems occurred and how to eliminate them. Regional and local staff with whom we spoke generally felt this report, as designed, was not useful.

Figure 10: Quality Control Management Report

DD-959 (AC-P) (08/05)		U.S. DEPARTMENT OF COMMERCE Economics and Statistics Administration U.S. CENSUS BUREAU							
QUALITY CONTROL CHECK STATUS REPORT OPERATION: ADDRESS CANVASSING 2006 CENSUS TEST									
LCO/CFO:3006/AUSTIN FOS: 01 CLD:0101		Print Date/Time: 08/18/2005 15:53:37 Page 1 of 5							
Production Lister Name	Lister Trans. Acct.	AA No.	Date AA Comp Production	Date AA Comp QC	QC Result	Map Error	Omission Error	Action Code Error	Editing Error
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)

Source: U.S. Census Bureau

Because QC and production managers did not understand why certain assignment areas were failing the quality check, and did not know which errors constituted a failure, they could not determine what the listers were doing wrong. For example, headquarters informed local and regional Census staff for the Cheyenne River Reservation that the site’s QC failure rate was high, but offered no explanations, leading local staff to make incorrect assumptions about what caused the failure and limiting their opportunities to correct problems.

Census headquarter officials agreed that the QC Check Status Report was inadequate and that the report should provide more feedback. Census also did not analyze QC data as it came in, and so it could not provide specific details about the problems QC listers were finding or how to fix them. Had headquarters analyzed the errors sooner it could have interviewed local census staff to identify any unique circumstances that caused an assignment area to fail. By waiting, the bureau missed the opportunity to obtain immediate feedback, quickly understand the source of the errors, and determine if QC or listing procedures needed adjustment during the operation to improve the listing process and lister performance.

¹⁷ Types of errors: a map error occurs when a map spot is placed incorrectly on the map; an omission error when a housing unit is not added; an action code error when an incorrect action code (e.g., delete, verify, or duplicate) is used; and an editing error when incorrect changes or edits are made to an address record.

C. Including Interviewee Information on the HHCs Would Facilitate the Quality Control Operation

Current address canvassing procedures require production listers to visit every housing unit in their assignment area, interview residents, and make observations to verify the address and other housing-related information. During quality control, the QC lister reviews a sample of address records to verify that the production lister updated the address and map correctly via observation and personal interview. Currently it is impossible to determine if either lister obtained information from an interview with a knowledgeable person. The accuracy of the address canvassing operation could be enhanced if the handheld computers captured whether the information was obtained by interview or only by observation.

Sometimes Census staff visit residents several times during various operations—a practice that may be considered burdensome to the public. We spoke with five residents from both test sites who had been visited more than once by listers, and there are likely others who were contacted multiple times. Capturing the interview information on HHCs might reduce the need for multiple visits to households because, for example, procedures could be adjusted to collect telephone numbers and subsequent follow-up could be conducted by telephone.

RECOMMENDATIONS

The Census Bureau director should direct appropriate management officials to take the following actions:

1. Design a comprehensive, targeted training course for QC listers that imparts the skills and knowledge necessary.
2. Disclose enough information about quality control failures to production managers so that they can take timely action to improve their listers' work during address canvassing.
3. Consider equipping handheld computers with the capability to identify whether an interview was conducted to facilitate quality control.



Synopsis of Census's Response

The Census Bureau generally agreed with our recommendations, stating that it will continue to try to improve training materials for the 2010 Census based on lessons learned from the 2006 test. The bureau also appeared satisfied that it had disclosed enough information to LCO managers regarding quality control failures, but stated that it will review procedures and make improvements where needed. The response also stated that any QC Check Status Report (DD-959) inadequacies did not create uncertainty as to whether or not the listers committed the errors because although the report lacked details regarding the precise errors made by listers, the design of the QC report was such that all four error categories provided on the report were lister errors.

However, the bureau agreed that the QC report was inadequate for providing the level of detail the LCO staff needed for effective feedback and retraining purposes. The bureau strongly objected to the statement in our draft report that its officials did not share the QC failure criteria with regional and local staff because it did not want their knowledge of such criteria to affect the QC results. While Census admitted withholding this information from listers, it stated that such information was never withheld from the management chain.

Finally, the bureau said it would consider, resources permitting, equipping handheld computers with the capability to identify whether an interview was conducted for the purpose of resolving discrepancies, but disagrees that it will reduce the need to contact the house more than once. In fact, the bureau contends recording such information would require a longer QC process and would require callbacks, which would definitely decrease the productivity of the DQC operation.

OIG comments

Regarding the discussion of the sharing of QC failure criteria with regional and local staff in our draft report, we were told at a September 9, 2005, meeting with Census headquarters officials that they deliberately kept the specifics of the quality control process, such as what exactly constitutes an error, from the regional and local staff because they felt this knowledge might influence the QC results. However, we later learned that at some point during the operation, managers were made aware of the QC failure criteria, so we have deleted this point from the final report.

We disagree that the QC Check Status Report did not create uncertainty as to whether or not the listers committed the errors. Because of the extensive software problems, it appeared that some errors were caused not by listers, but by faulty software. For example, problems with the GPS software could cause map errors and post office box edits could have been incorrectly programmed as edit errors.

We concur with the bureau that recording interview occurrence would not necessarily increase the efficiency of the operation, and changed the text in the body of the report to reflect that accuracy would be the primary benefit. Reducing the need to contact households more than once was also eliminated from the recommendation. However, we want to emphasize that recording that an interview occurred and possibly collecting limited interview information would also allow for procedures to be altered. For example, if household telephone numbers were obtained, subsequent telephone interviews could be made to resolve discrepancies, conduct quality assurance checks, and obtain information for future operations. Telephone follow-up, if feasible, would serve to increase efficiency.

IV. MORE FOCUS ON OUTREACH IS NEEDED

In the 2000 census, the bureau used outreach and promotion to develop community support and participation. Activities included a paid advertising campaign, a partnership program,¹⁸ promotions and special events, and a media relations effort,¹⁹ all of which sought to (1) increase the overall census response rate, (2) reduce the undercount of racial and ethnic groups and other hard-to-enumerate (HTE) populations, and (3) communicate a consistent message. As we have reported in the past, most agree that Census 2000 was a success in terms of raising awareness, particularly among HTE populations.²⁰ But according to the bureau, it is difficult to show a direct link between outreach activities and increased response, particularly among American Indians and Hispanics.

In choosing an American Indian reservation and a county with a large Hispanic population as test sites, Census had a unique opportunity to assess new outreach methods. The bureau set out to establish and evaluate the effectiveness of a tribal liaison program at the Cheyenne River Reservation site. It also hired partnership program staff for both sites. However, the materials for the tribal liaison staff are late, and we found that methods to measure the success of the partnership program were not explored. In addition, we noted that a fully functional partnership database may not be available for the 2010 decennial operation.

A. The Revised Tribal Liaison Program Handbook Was Not Finished in Time for Address Canvassing

The Cheyenne River Sioux tribal chairman designated an individual to serve as the tribe's liaison with the bureau. The liaison is the main point of contact for the bureau on matters relating to the reservation and is not a paid Census employee. During address canvassing, the tribal liaison helped Census (1) secure involvement of community-based groups to promote address canvassing, (2) compile information about benefits to the tribe from having complete and accurate census data, and (3) identify community events at which the bureau could promote the census and related job opportunities.

One of Census's 2006 test objectives is to assess the effectiveness of the Tribal Liaison Program and obtain the liaison's feedback on a revised Tribal Governments Liaison Program handbook, which contains information about the confidentiality of census information and activities for increasing tribal participation in the census. The bureau had not finished revising the handbook in time for address canvassing so it could not get input from the liaison. In addition, the liaison

¹⁸ This effort, considered critical by the Census Advisory Committee, places partnership specialists in each LCO to develop working relationships with governmental and nongovernmental units, community-based organizations, faith-based organizations, schools, media, and businesses in order to increase awareness of and support for census activities (e.g., recruiting, address canvassing, enumeration). Members of the advisory committee are drawn from private sector, academic, and nongovernmental organizations; Census regional management; and other groups.

¹⁹ The mailing strategy (e.g., sending pre and post notices, replacement questionnaires, envelope language) is considered another component of outreach and is being tested in other survey (versus site) tests for the decennial.

²⁰ U.S. Department of Commerce Office of Inspector General, Spring 2002. *Improving Our Measure of America: What Census 2000 Can Teach Us in Planning for 2010*, OIG-14431. Washington, D.C.: Department of Commerce OIG, iii.

has had to rely on the materials used in 2000, rather than updated information. To meet its objective, Census must complete the handbook revision, obtain input from the liaison before the end of the test, and determine if the program was hampered because older materials were used by the liaison.

B. Evaluating Partnership Methods and Messages Was A Missed Opportunity

The partnership is the primary vehicle for conducting outreach in the 2006 test; the partnership program pairs partnership specialists with local census offices, and together they work with state, local, and tribal governments; community groups; nongovernmental organizations; local media; and the private sector. Organizations that partner with the bureau help publicize the census and sponsor educational and other community activities to promote participation. The Cheyenne River and Travis County offices each hired one partnership specialist for the 2006 test.

In Census 2000 the bureau hired some 690 specialists, who partnered with more than 140,000 organizations. It spent \$142.9 million on the program (2 percent of the total cost of the 2000 decennial).²¹ Census expects to implement and fund a similar program for the 2010 decennial. To justify such a high cost, the bureau must see results—namely, a measurable increase in the response rate among HTE populations.

Following the 2000 decennial, the bureau commissioned three major research evaluations of the partnership and marketing programs.²² In a summary of the evaluations, the bureau states that the success of the outreach activities is “intuitively compelling,” however a direct connection between the outreach and response rates is difficult to quantify. For example, one of the evaluations surveyed partners who reported that both the partnership activities and census in schools²³ programs were relatively successful in reaching hard-to-enumerate populations. Still, Census has no way to quantify the number of individuals reached or increases in participation rates. The only suggestion made by the authors of the evaluation was to conduct a comprehensive “case study” approach using both qualitative and quantitative methods to assess the reach of local partner activities.

In the 2006 test, the bureau had an opportunity to try new methods for increasing response among American Indians on the Cheyenne River Reservation and Hispanics in Travis County, which make up 74 percent and 26 percent, respectively, of the populations in the sites. Our discussions with Census Advisory Committee members, Cheyenne River Sioux tribal officials, and partnership specialists at both sites revealed that a key concern impacting residents’ willingness to respond was whether collected information would be shared or used against them. Census did not incorporate any outreach research questions into the 2006 test, thereby missing an

²¹ Costs are from October 1997 through September 2000, with \$65.1 million spent on salaries and benefits and the remainder for nonpayroll expenditures such as travel, training, supplies, and postage. From *Review of Partnership Program Highlights Best Practices for Future Operations*, GAO-01-579, August 2001.

²² U.S. Census Bureau, February 2006. *Evaluations of the Census 2000 Partnership and Marketing Program*, Census 2000 Topic Report No. 6. Washington, D.C.: Census Bureau.

²³ A program that provided teachers with interactive lesson plans to help students understand the importance and benefits of the census for the purpose of promoting awareness and encouraging household participation.

opportunity to assess key aspects of the partnership program, perhaps establish a methodology to quantify its benefits, and evaluate broader communication strategies for reaching the two hard-to-enumerate populations that resided in the sites.

The bureau claims that timing and test design limitations precluded assessment of broader communication strategies, and that the earliest chance for evaluating such strategies will be the 2008 dress rehearsal.²⁴ If an American Indian reservation is not chosen as a dress rehearsal site, then the opportunity for assessing new outreach methods for this population will be lost.

C. A Tool for Tracking Partnership Information Should Be Available in Time for 2010

The database used to track all external partnerships and customer relations in 2000 was replaced by a Web-based system to better allow headquarters and regional field staffs to track, plan, strategize, and analyze partnership and data services.²⁵ The database, known as PRISMS,²⁶ was also supposed to provide a cost-effective means for (1) communicating with partners via e-mail, fax, and postal correspondence during the decade between decennials and (2) seeking their support for nondecennial activities, such as the American Community Survey. (This communications activity had been requested by census advisory committees after the 2000 decennial.)

Census headquarters officials told us that lack of funding prevented completion of the communication functionality. PRISMS' inability to send mass communications has not inhibited the 2006 test—the test sites are relatively small and partnership specialists are familiar with the organizations and populations in their community. Of greater concern is the bureau's characterization of the PRISMS system as “limping along” and in such poor shape that it cannot support partnership activities beyond a few test sites. Only a few locations are involved in this test and the 2008 dress rehearsal, so PRISMS should be operable. But as more partnership specialists are added to the system, Census reports that it will become unstable and stop working. Census officials confirmed that PRISMS will not be able to support the partnership effort when the 12 regional partnership coordinators, brought on board in 2007, begin work on the 2010 decennial.

Census does not plan to use PRISMS in 2010. It has included a modified/expanded PRISMS-type system in the FDCA contract, but that system will not be in place for the 2008 dress rehearsal and is secondary to other contractual priorities such as development of HHC capabilities. Partnership coordinators hired in 2007 will not have a partnership database to work with and the bureau does not have a contingency plan for tracking partnership efforts for the 2010 decennial, should the PRISMS replacement not materialize. The inability to access a database of 140,000 partners from the 2000 census, catalog new partners and commitments, and communicate with partners efficiently is a serious problem, given the impact that partners can

²⁴ Some questions, mailing package design features, and deadline language, also considered to be outreach activities, are being tested in other survey (versus site) tests.

²⁵ Data services refers to regional and headquarters efforts to educate partners on how to access and use census data throughout the decade.

²⁶ PRISMS is not an acronym and has no specific meaning.

have on improving participation of hard-to-enumerate communities. A useable partnership database, or another resource to facilitate tracking partnership information, should be in place for the 2010 decennial.

RECOMMENDATIONS

The Census Bureau director should direct appropriate management officials to take the following actions:

1. Complete the Tribal Governments Liaison Program handbook in time for the tribal liaison to review it and suggest changes prior to the end of the 2006 test.
2. Develop ways of measuring and evaluating the impact of partnership activities.
3. Ensure that a useable partnership database, or another resource to facilitate tracking partnership information, is in place for the 2010 decennial.



Synopsis of Census's Response

The Census Bureau agreed to complete the Tribal Government Liaison Program handbook prior to the end of the 2006 test, if possible, and said it planned to share the handbook with stakeholders before it is finalized. The bureau reiterated the difficulty of measuring and evaluating the impact of partnership activities, but stated that it would continue to explore ways to do so. Census said that both the direct and indirect benefits of partnership efforts can only be measured during an actual census and would have to take advertising and promotional efforts into account. The bureau also stated that measuring partnership activities using a controlled experimental design during a census cannot be done because of the actual, or perceived, differential effects on census coverage that might result. Finally, the response to the final recommendation, implementing a partnership database for the 2010 decennial, indicated that this effort is underway and will continue.

OIG comments

Although Census generally agreed with our recommendations, the response does not indicate any tangible actions that will be taken to better measure the impact of partnership activities. Census needs to fully address the recommendations in its action plan, citing specific actions it will be taking, including a timeline for such actions.

V. CENSUS SHOULD IMPROVE GUIDANCE FOR OVERTIME AND CELL PHONE USE AND TEST NEW APPROACHES TO TRAINING

Planning for the 2010 census offers new challenges, as the automation of key field operations is a new feature of this decennial and uncharted territory for the bureau. We assessed aspects of the administrative and logistic support for the 2006 test and found weaknesses in overtime and cell phone reimbursement policies and training guidance and implementation.

A. *Census Needs to Clarify Its Overtime Policy and Improve Its Cell Phone Reimbursement Policy*

During the decennial, overtime and cell phone costs can quickly grow out of control if not properly managed. Census structured field positions for all decennial operations in an effort to enable employees to complete their assignments within a 40-hour workweek. It also established a cell phone reimbursement policy designed to keep those costs in check.

We found problems with the implementation of the overtime policy. For example, in Travis County, staff construed the overtime policy to mean overtime was forbidden, which was not the intention and may have hampered the effectiveness of the operation. As for cell phone use, the policy seems unduly burdensome to implement and does not adequately reimburse employees who make census-related calls on their personal cell phones. We believe Census should revisit both policies and possibly clarify or modify them.

The Overtime Policy Needs Clarification

Census has many procedures in place to make employees aware of the overtime policy. Both supervisory and nonsupervisory personnel must sign overtime policy agreements, which define overtime as hours that are “ordered and approved in advance” and exceed 8 hours a day or 40 hours a week. The agreement also states that an employee who works overtime without obtaining prior approval is subject to termination. Field operation supervisors, crew leaders, and listers are told numerous times during training that employees may not work more than 8 hours in any one day, or more than 40 hours in any weekly pay period unless specifically authorized to do so in advance or because the overtime was caused by “unavoidable circumstances.”²⁷

It is our understanding that the current policy is needed so that (1) supervisors, not employees, determine whether overtime is necessary, (2) all overtime is claimed and paid, and (3) the rules governing overtime are straightforward and nondiscriminatory. The bureau recognizes that extenuating circumstances may sometimes make overtime unavoidable, and in fact necessary, particularly for field supervisors, who may be called on to respond to unusual situations in the field. However, Travis County field staff did not make the distinction between approved versus unapproved overtime; consequently, working overtime was synonymous with getting fired. No employees requested overtime and no approved overtime occurred.

²⁷ Unavoidable circumstances include weather-related problems such as a blizzard, flood, hurricane or if an employee is involved in or delayed by an accident. Traffic alone is not considered an unavoidable circumstance.

We identified several areas where the implementation of the overtime policy needs strengthening and offer the following suggestions:

- **Underscore that overtime is allowed and ensure that the policy is stated consistently.** In Travis County, employees we spoke with appeared not to understand that they could request overtime. Various bureau manuals gave slightly different statements of the overtime policy: training guides for field operations supervisors and office clerks stated that employees will be terminated on the first occurrence of unapproved overtime, the LCO administrative manual allowed for a warning on the first occurrence, and all other manuals stated that employees would be *subject* to termination for working unapproved overtime absent evidence of unavoidable circumstances, but did not explicitly state that they would be let go.
- **Budget and manage overtime as a necessary part of the operation.** Recognizing that there are situations when overtime is necessary, those closest to the operation should be allowed to budget and manage overtime. We suggest the bureau test an overtime pool approach—that is, provide local office managers with a pool of overtime hours to be used to effectively manage the operation.
- **Give straightforward guidance on the supervisory chain of command.** During address canvassing, LCO managers had authority to approve overtime, with the regional office providing oversight.²⁸ Census needs to issue guidance describing who employees should contact for overtime approval and stipulating that some approving official must always be available: for example, assistant managers, who work 40 hours Monday through Friday, would not be available to approve overtime on Saturday, so someone else must be designated. Census guidance must establish a chain of command that covers all potential working hours.
- **Adequately train supervisors about when and how to approve overtime.** The process for requesting and approving overtime is not taught during classroom training. Field operation supervisors and crew leaders receive a self-study assignment on documenting employee performance and requesting overtime, but there is no comparable assignment for the listers. It would be useful if staff training addressed appropriate overtime situations and the mechanics of requesting overtime, including, for example, if an employee can request and receive approval by telephone.
- **Tabulate and display hours worked on the HHC.** For nonresponse follow-up, the bureau is testing automation of daily pay and work records on the HHC. Timekeeping problems, such as addition errors, would be minimized if hours were automatically calculated and displayed on the HHC and employees received automated reminders of how many hours they've worked in a given pay period.
- **Extend allowable daily work hours from 8 to 10.** In rural areas such as Cheyenne River, it may take a significant amount of time to travel to an assignment area and canvass a

²⁸ During the 2000 census, regional offices were responsible for approving all overtime requests.

geographically large block, meet with the crew leader, and drive home. We observed two listers at the Cheyenne River test site who did not complete their assignments so as not to exceed the 8-hour restriction and had to make the same lengthy trip the following day to finish the work. Census officials reported that they are considering allowing 10-hour days.

- **Account for all lister time.** The bureau requires daily HHC transmissions, yet it has no written guidance specifying how or whether employees should charge the time spent preparing to transmit. Listers received inconsistent instructions about the amount of time to charge. Some crew leaders advised them to claim 15 minutes, others said 5 minutes, and still others gave no guidelines. Employees need clear, consistent written guidance on how to account for this time to ensure they receive proper credit and do not inadvertently claim unapproved overtime.

It is important to ensure that the overtime policy is understood and well implemented. We recommend that the bureau address some of the implementation problems we identified during the address canvassing operation of this test.

Cellular Telephone Policy Does Not Fully Reimburse Users

The bureau's reimbursement policy for cell phone calls states that employees will be reimbursed for Census-related calls made on their personal phones provided the minutes used were not covered by the free minutes in a user's payment plan. Employees must provide a detailed billing statement that highlights official Census calls. Reviewing and processing these bills for reimbursement takes up large amounts of staff time.

In both the 2004 test and the 2006 address canvassing operation, field supervisors often used more minutes than were eligible for reimbursement. Many reported having to pay for personal calls because Census-related calls used all of their plan minutes. In addition, employees could not document and seek reimbursement for bureau-related calls that did not have a telephone number associated with them on the bill.

Cell phone usage may not have been an issue with the 2000 Census; however, with the growth and increasing reliance on cell phones, we question whether this policy will be manageable for the 2010 decennial. Census may find it more efficient to rent or purchase cell phones for some of its employees to use and negotiate plan rates at the regional or national levels, or set a specific dollar allowance to cover cell phone use.

B. Failure to Test New Training Methodologies and Give Adequate Guidance Weakened Address Canvassing

The bureau used its traditional recruiting and hiring practices to build a temporary workforce. It continued its use of verbatim training, whereby recently trained staff read the training manual word-for-word to their crew. Past evaluations of this approach have questioned its use. In the 2006 test, the bureau had the opportunity to enhance verbatim training or try different approaches, but it did not.

Census Should Test Training Enhancements in Future Operations

For the 2004 test, Census hired a contractor to evaluate the training effort for that operation²⁹ and our office assessed training as well. We both found that trainees had difficulty following HHC instruction and suggested several improvements. The only apparent change in 2006 was that the classroom schedule was modified from Monday through Friday to a Friday, Monday through Thursday timetable. The second Friday was an optional training day.

We urge the bureau to incorporate some of the following approaches in future operations and measure their impact on trainee comprehension and performance:

- **Use of media.** For future training, the bureau should consider using a mix of DVD, VCR, and internet media for homework assignments and other portions of the class.
- **Visual aids.** Some class participants had trouble following the verbatim instructions and might have benefited from the use of visual aids.
- **Realistic GPS training.** Instead of placing map spots on a blank HHC screen, listers would benefit from using the GPS you-are-here indicator to place a map spot on an HHC map.
- **Role play.** Greater use of role play, such as practicing interviews to obtain a location address, P.O. box, or other mailing information, would have given listers simulated, hands-on experience performing their duties.

Improvements Are Needed In Other Aspects of Training

Census gave no guidance for accommodating evening classes. Classroom training materials are geared toward daytime classes with an estimated 35 hours of instruction. The four Travis County evening classes attempted to cover the same material in fewer hours, resulting in training that was rushed and confusing, and leaving many trainees with unanswered questions. Census needs to develop a schedule and agenda for evening training that is workable and covers the same material as the daytime classes.

²⁹ Eagle International, Inc., “2004 Census Test Review & Evaluation of Training Efficacy.” Prepared for the Census Bureau under contract # OPM-01-01070, April 2004, Rochester, New York.

LCO strategy for training crew leaders and crew leader assistants differed. To fill crew leader positions, the Travis County LCO invited applicants to training and paid them the crew leader wage (\$16 per hour) while they were in the class. Those who performed well in training and seemed to possess supervisory skills were chosen as crew leaders. The remaining class members became crew leader assistants and their hourly wage dropped to \$14.50.

The Cheyenne River Reservation took the opposite approach: applicants were invited to crew leader assistant training and told that those who performed well would become crew leaders. The local office selected trainees for crew leader according to their ability to use the HHC, their understanding of procedures, demonstrated supervisory skills, and desire to be in a leadership position. The reservation's approach not only saved money by paying the lower wage during training, it also motivated participants to do well in the hope of being promoted.

Crew leaders did not always train their own team of listers. Less than 5 percent (10 out of 216) of listers were trained by their crew leaders in Travis County. As a result, listers had trouble scheduling their initial on-the-job observation and starting fieldwork because their leader was teaching another class and assignments were not sorted out. When we told the Dallas Regional Office officials that crew leaders had not trained most of their crew, they were surprised by this and have taken actions intended to ensure that it does not occur during nonresponse follow-up training.

Bureau officials stated that they expect crew leaders to train their listers³⁰ and acknowledged that there was a miscommunication with the local office in Travis County. For future operations, the instructions for scheduling and assigning field staff to the initial training classes should be clarified to ensure that crew leaders train their own crews.

RECOMMENDATIONS

The Census Bureau director should direct appropriate management officials to take the following actions:

1. Clarify the overtime policy.
2. Explore options for meeting the cell phone needs of some Census employees. Census may find it more efficient to rent or purchase cell phones for some of the employees to use and negotiate plan rates at the regional or national levels, and/or to set a specific dollar allowance to cover cell phone use.
3. Modify and field test the training and class schedules and evaluate their impact on the staff's comprehension and performance during the decennial dress rehearsal.
4. Clarify the instructions for scheduling and assigning employees to the initial training sessions to ensure that to the extent possible, crew leaders train their crew.

³⁰ Replacement and evening training classes are the exception, as the classes contain a mix of listers from all crew leader districts, thus listers are not paired with their crew leader.



Synopsis of Census's Response

The Census Bureau indicated that it would explore ways to comply with our recommendations to clarify the overtime policy, review the cell telephone policy, and modify the instructions for scheduling and assigning employees to ensure crew leaders train their crew. The bureau stated that it lacked resources, both financial and staff, to field test different training approaches and class schedules and evaluate their impact on the staff's comprehension and performance before the decennial.

OIG comments

We are pleased that the bureau will explore ways to comply with most of the recommendations in this section. In its action plan it should detail the options it considered and the specific actions it will be taking, including a timeline for such actions. The bureau stated in its response that it would welcome any suggestion OIG might have related to the overtime policy. The bureau should refer to page 33 of this report, which offers a number of suggestions that would strengthen the overtime policy. In addition, we agree that testing training prior to the dress rehearsal would be difficult to accomplish at this time, although we suggest the bureau make some modifications for dress rehearsal training. We changed the recommendation pertaining to training accordingly.

VI. CONCLUSION: VALUABLE LEARNING OPPORTUNITIES WERE MISSED IN THE 2006 TEST ADDRESS CANVASSING OPERATION

The 2006 site test is part of the Census Bureau’s strategy to evaluate reengineered operations under realistic conditions, well in advance of the 2010 census. Tests require a considerable investment of resources—staff hours in planning and development at Census headquarters and implementation costs in the field—to yield important information for planning the upcoming decennial.

We concluded that the bureau only partially achieved its objectives for the 2006 test of address canvassing. It gained only limited information about new automation, procedures, and processes to analyze and apply to the decennial. We believe the bureau could have earned a better return on its investment if it had evaluated other aspects of address canvassing and had furnished well-functioning handheld computers. In addition, the bureau has not provided any analysis justifying the use of 100 percent address canvassing, and it is unclear whether the benefits of such comprehensive canvassing outweigh the costs.

Figure 11: Census Evaluation Program for Address Canvassing

Research Questions	Status
1. How does automating the address canvassing operation: a. Reduce the amount of time it takes to collect data? b. Reduce the amount of time it takes to post-process collected data? c. Improve the quality of the collected data? d. Improve the performance of the listers in collecting the data?	Cancelled
2. Is GPS a sufficiently accurate means for collecting coordinates of living quarters?	Cancelled
3. Does the verification operation correctly identify addresses to be deleted?	Revised
4. Lister’s spatial ability using HHC maps & GPS	No Change

Source: U.S. Census Bureau

Benefits of the 2006 Address Canvassing Operation Uncertain Because of HHC Problems and Limited Test Objectives

According to the bureau, tests are performed for the express purpose of providing data and information upon which to make the most informed decisions about the methods, procedures, and systems to be used in the actual census. The bureau also states that the core of the testing strategy is the set of research questions and the evaluations designed to answer them. Evaluations analyze, interpret, and synthesize the effectiveness and impact of operations.

Census had planned mainly to evaluate the use of handheld computers and the new delete verification process for address canvassing in the 2006 test. But reliability problems with the HHCs disrupted lister training and canvassing, made it difficult for listers to follow procedures, and marred test results. Consequently, the bureau stated that it curtailed its evaluation program because it could not obtain the accurate data needed for a comprehensive quantitative analysis, such as lister production rates and acceptable address coordinates. The bureau stated its reduced fiscal year 2006 appropriation was also a factor in curtailing the evaluation program. Figure 11 summarizes the status of the research questions the bureau planned to evaluate during address canvassing, only one of which remains unchanged.

Census was able to finish the address canvassing operation and intends to prepare informal assessments of various aspects of the operation (qualitative rather than quantitative assessments).³¹ For example, bureau officials told us they are analyzing the address coordinate data collected. However, as noted in chapter I of this report, the bureau does not have sufficient information to explain problems with GPS and associated problems with manual coordinate collection to proceed with a nationwide coordinate collection program for the 2010 census. To make informed decisions about the reengineered address canvassing operation for the decennial, Census needs to answer the research questions originally asked for this test.

In light of the known problems with the HHCs, if the following issues had been addressed the test could have been more valuable to the bureau. The sites selected for the test were either all city-style addresses receiving their census questionnaires by postal delivery, or rural areas where a costly bureau operation delivered the questionnaires. As we discussed previously, the bureau had identified rural areas where having the post office deliver questionnaires might reduce costs, but none were included in the 2006 test. The test offered a unique opportunity to evaluate alternative approaches to training, as well as the impact of the partnership program on the hard-to-enumerate populations located in Travis County and the American Indian community that resides on the Cheyenne River Reservation. Evaluations from the 2000 decennial had recommended further studies in these areas.

Benefits Versus Cost of 100 Percent Address Canvassing Need to Be Evaluated

After observing the address canvassing operation, we believe that Census needs to better clarify its rationale and decision to canvass 100 percent of the nation for the 2010 decennial. Census had initially intended to target selected areas for canvassing, but now plans to have listers knock on nearly every residential door in the nation—an estimated 115 million addresses—to update the master address file. The bureau believes 100 percent canvassing will allow it to collect GPS coordinates for all addresses, identify group quarters, and treat all jurisdictions equally. However, the bureau has provided no analysis that demonstrates why 100 percent canvassing is the best approach. A 2004 report by the National Research Council asked for more analysis and questioned the cost-benefit of this decision (see box).³²

From our observations, the address list appeared to be fairly stable, particularly in the Travis County test site with city-style addresses. In its own evaluation of Census 2000 address-building activities, the bureau

**National Research Council
Recommendation 3.6:**

The Census Bureau should evaluate the necessity of its plans to conduct a complete block canvass shortly before the 2010 census. Such justification must include analysis of extant census operational data and should include, but not be limited to, the following:

1. arguments as to why selective targeting of areas for block canvass is either infeasible or inadequate, and as to how the costs of the complete block canvass square with the benefits; and
2. analysis of how a full block canvass fits in the Census Bureau's cost assumptions for the 2010 census.

³¹ Unlike evaluations, operational assessments document final volumes, rates, and costs for individual operations or processes. Assessments include some discussion of data, but do not include explanation of error. Results from operational assessments can identify new research questions requiring new evaluations.

³² National Research Council, 2004. *Reengineering the 2010 Census: Risks and Challenges*. Washington, D.C.: National Research Council, p 98.

reports that the U.S. Postal Service was the most significant contributor of address list improvements for city-style addresses where mail delivery occurs. Consequently, to assess address file improvements as a result of the address canvassing operation, the bureau needs to determine how many of the changes made during the operation would have been captured by an updated address file from the Postal Service. In addition, the bureau should identify the number of hidden units, such as basement or garage units, uncovered during address canvassing, as this operation is most likely the best way to discover such living quarters. It is only by comparing costs and benefits of the operation that the merits of conducting a 100 percent canvassing operation can adequately be assessed.

RECOMMENDATION

The Census Bureau director should direct appropriate management officials to perform an analysis of the costs and benefits of 100 percent address canvassing and consider whether alternative, less costly strategies for developing the address list for the 2010 decennial are feasible.



Synopsis of Census's Response

The Census Bureau's response asserts that anything less than 100 percent address canvassing in all areas would result in some addresses being left out of the initial address list for the 2010 Census. It indicated that it had planned to test some alternatives this decade but claimed that funding reductions prevented it from doing so. Having lost that opportunity, the bureau believes it cannot risk using an untested alternative and must therefore canvass 100 percent of the nation.

OIG comments

OIG is not advocating for or against 100 percent canvassing. However, continuously maintaining the master address file to permit targeted address canvassing was a cornerstone of Census's original reengineered design. Then, with little explanation, the bureau abandoned this aspect of its design and reverted to 100 percent address canvassing at an estimated increase of \$38 million to the life-cycle costs of the 2010 census,³³ but did not articulate any alternatives it may have considered and their relative costs and benefits. By asserting in its response that anything less than 100 percent address canvassing in all areas will, by definition, result in some addresses being left out of the initial address list for the 2010 census, the bureau implies that 100 percent address canvassing will not miss addresses. Although intuitively appealing in concept, 100 percent address canvassing has significant challenges of its own, and unfortunately, even this expensive operation cannot render a perfect address list—an outcome bureau officials readily acknowledge. Since Census has not provided any evidence that 100 percent address canvassing produces an address list that is more accurate than one that could be produced with an alternative methodology, we question whether the additional expense of 100 percent address

³³ U.S. Census Bureau, March 1, 2004. *Estimated Life Cycle Costs for the Reengineered 2010 Census of Population and Housing*, 2010 Census Planning Memoranda Series No. 27, Washington, D.C.: Census Bureau.

canvassing is justified. The bureau's obligation, then, is to identify the most cost effective approach to obtaining an address list of requisite quality to support the 2010 decennial goals for accuracy of census coverage, cost containment, and operational risk.

SUMMARY OF RECOMMENDATIONS

The Census Bureau director should direct appropriate management officials to take the following actions:

1. Enhance the reliability of automation in future tests and operational programs by
 - a. continuing to improve system development practices and
 - b. using contractors to fill any staffing gaps or, when warranted, to handle system development (see page 8).
2. Develop an adequate handheld computer capability for collecting address coordinates by
 - a. determining the factors that affect the reliability of GPS and accuracy of address coordinate collection, and
 - b. developing a plan for implementing and testing improvements so that this capability effectively supports decennial operations (see page 8).
3. Ensure that the FDCA contract appropriately addresses automation issues identified in the 2006 test. These include system reliability, performance, and usability; GPS processing; and HHC street mapping capabilities (see page 9).
4. Establish a process for timely analysis of test results and incorporating resulting requirements changes for address canvassing and nonresponse follow-up into the FDCA contract. If possible, incorporate changes to address canvassing requirements before contract award (see page 9).
5. Determine why the TIGER map database contains nonexistent roads and develop approaches to eliminate such roads nationwide from the database by the 2010 census (see page 14).
6. Refine lister training to provide clear and effective instruction on when and how to correct maps and adjust routes (see page 15).
7. Provide computer prompts to aid listers in following procedures for deleting addresses, obtaining complete address information during the interview process, placing precise map spots, and canvassing complex blocks efficiently (see page 17).
8. Develop and implement a mechanism for alerting local Census officials about assignment areas that may be difficult to canvass (see page 17).
9. Review the block formation process and reduce block complexity where possible (see page 17).
10. Determine what addresses are sufficiently clustered to shift bureau delivery of questionnaires to postal service delivery, and include such areas as trials in the 2008 dress rehearsal (see page 18).

11. Design a comprehensive, targeted training course for quality control listers that imparts the skills and knowledge necessary (see page 24).
12. Disclose enough information about quality control failures to production managers so that they can take timely action to improve their listers' work during address canvassing (see page 24).
13. Consider equipping handheld computers with the capability to identify whether an interview was conducted to facilitate quality control (see page 26).
14. Complete the Tribal Governments Liaison Program handbook in time for the tribal liaison to review it and suggest changes prior to the end of the 2006 test (see page 28).
15. Develop ways of measuring and evaluating the impact of partnership activities (see page 29).
16. Ensure that a useable partnership database, or another resource to facilitate tracking partnership information, is in place for the 2010 decennial (see page 30).
17. Clarify the overtime policy (see page 32).
18. Explore options for meeting the cell phone needs of some Census employees. Census may find it more efficient to rent or purchase cell phones for some of the employees to use and negotiate plan rates at the regional or national levels, and/or to set a specific dollar allowance to cover cell phone use (see page 34).
19. Modify and field test the training and class schedules and evaluate their impact on the staff's comprehension and performance during the decennial dress rehearsal (see page 35).
20. Clarify the instructions for scheduling and assigning employees to the initial training sessions to ensure that to the extent possible, crew leaders train their crew (see page 35).
21. Perform an analysis of the costs and benefits of 100 percent address canvassing and consider whether alternative, less costly strategies for developing the address list for the 2010 decennial are feasible (see page 38).

APPENDIXES

APPENDIX A: SUGGESTED IMPROVEMENTS TO HANDHELD COMPUTERS

#	Current HHC Functionality	Suggested Improvement
1	No automated support for interview and only limited guidance for updating address record	Script that prompts listers step-by-step through (a) interviewing the structure's occupant and (b) updating address record
2	No automated guidance to reinforce training in how to handle difficult situations (e.g., determine if a multiunit structure qualifies as "other living quarters")	Guidance information, such as definitions, for following procedures that the lister can access via pop-up windows, hyperlinks, etc.
3	Time consuming to update apartment address records individually	Ability to update address records for individual apartments as a group, when appropriate
4	Lister chooses level of HHC map precision to zoom to place map spot	Automatically zoom to the best level of HCC map for placing map spot
5	No indicator if housing unit resident was interviewed	Indicator showing whether a housing unit resident was interviewed
6	No field to record additional interviewee information (e.g., E-911 or additional P.O. boxes)	Field for recording additional interviewee information

APPENDIX B: GLOSSARY

Item (Acronym)	Definition
Advance Visit	An operation to contact respondents at identified Group Quarters to alert them to the enumeration that follows, to collect basic identifying information such as the name of the contact person, and to schedule an appointment for enumeration.
Assignment area	The census block or group of blocks assigned to a lister.
Coverage follow-up	An operation designed to improve coverage by collecting additional information from households with potential errors, such as duplicate persons, mail-back questionnaire discrepancies, and large households (more than 6 persons). The method involves a telephone and field visit for those that are not contacted by telephone.
Coverage measurement	An operation designed to provide estimates of coverage error using methods such as clerical computer-assisted matching, computer matching, and interviewing.
Crew leader	Responsible for training, supervising, and monitoring the quality of lister work.
Crew leader assistant	Staff drawn from the pool of enumerators to aid crew leaders with some field operations by performing specific crew leader functions.
Crew leader district	The area assigned to a crew leader, formed by grouping together a number of enumerator assignment areas.
Dependent Quality Control (DQC)	A field check of every assignment area that has been completed. Beginning at a random starting point a certain number of addresses (12 consecutive housing units in Travis County and 8 at the Cheyenne River test site) in each completed assignment area is reviewed.
Enumeration	The process of interviewing people and recording the information on census forms.
Field Data Collection Automation (FDCA)	A program that consists of automation resources, applications, and infrastructure necessary to support field data collection operations in the 2010 census.
Field operations supervisors	Responsible for training, supervising, and monitoring the quality of crew leader work.
Field verification	For questionnaires without Master Address File identification numbers, enumerators verified the existence of units that had been geocoded to a census block, but did not match an address in the Master Address File.
Geocode	A code used to identify a specific geographic entity. For example, the geocodes needed to identify a census block are the state code, county code, census tract number, and block number.
Global Positioning System (GPS)	A system of 24 satellites used to locate any point on the earth by triangulation and distance measuring.
Group Quarters	A living quarter in which unrelated people live or stay other than the usual housing unit. Two types of group quarters are recognized: institutional (for example, nursing homes, hospitals,

	hospices, and prison wards) and noninstitutional (for example, college or university dormitories, military barracks, group homes, shelters, missions, and flophouses).
Group quarters validation	An operation to identify and validate group quarter addresses.
Handheld computer (HHC)	A small electronic device that has a self-contained processing unit, contains telecommunications capabilities, and is easily transportable.
Hard-to-enumerate (HTE)	An area for which the environment or population may present difficulties for enumeration.
Housing unit	A single-family house, townhouse, mobile home or trailer, apartment, group of rooms, or single room that is occupied as a separate living quarters or, if vacant, is intended for occupancy as a separate living quarters. See "separate living quarters."
Map spot	A dot on a census map that shows the location of a structure containing one or more living quarters.
Master Address File (MAF)	A computer file of every address and physical/geographic location description known to the Census Bureau.
PRISMS	The database used to track, plan, strategize, and analyze partnership and data services with local, regional, and headquarters access.
Quality Control (QC)	Various statistical methods that validate that products or operations meet specified standards. For the 2006 address canvassing operation, the QC process consisted of a dependent quality control review and the verification of deleted addresses, duplicate addresses, and house number changes.
Separate living quarters	Living quarters in which one or more occupants live separately from any other individual(s) in the building and have direct access to the living quarters without going through another living quarters, such as from outside the building or through a common hall.
Service based enumeration	A method designed to count people at facilities that primarily serve people without conventional housing, such as emergency or transitional shelters, soup kitchens, and regularly scheduled mobile food van stops.
Topologically Integrated Geographic Encoding and Referencing database (TIGER)	A digital (computer-readable) geographic database of all census-required map features.
Transient night	A type of group quarters enumeration in which special procedures are used to count people at transient locations, such as campgrounds at racetracks, recreational vehicle campgrounds and parks, commercial and public campgrounds, fairs and carnivals, and marinas.
Update/Enumerate	A method to collect data in communities that may not have house-number-and-street-name mailing addresses. Enumerators complete a questionnaire for each housing unit listed and update addresses and maps.
Update/Leave	A method to collect data in which enumerators deliver a census questionnaire to each housing unit to be completed and returned by mail. This method is used primarily in areas where many homes do not receive mail at a city-style address. Enumerators also update addresses and maps.

Source: Census and OIG

APPENDIX C: CENSUS'S RESPONSE



UNITED STATES DEPARTMENT OF COMMERCE
Economics and Statistics Administration
U.S. Census Bureau
Washington, DC 20233-0001
OFFICE OF THE DIRECTOR

MEMORANDUM FOR Judith J. Gordon
Assistant Inspector General for Systems Evaluation

Through: E.R. Anderson *E.R. Anderson* MAR 27 2006
Acting Deputy Under Secretary
for Economic Affairs

From: Charles Louis Kincannon *CKincannon*
Director

Subject: Draft Report No. OIG-17524/February 2006 — *Valuable Learning
Opportunities Were Missed in the 2006 Test of Address
Canvassing*

The attached is in response to your request of February 21, 2006, for comments on the above-referenced report. We appreciate the opportunity to review the report prior to publication.

Attachment

cc: US/EA

Draft Report No. OIG-17524/Feb 2006
Valuable Learning Opportunities Were Missed in the 2006 Test of Address Canvassing
U.S. Census Bureau Comments

General Comments

First, we are troubled by the title of this report. While it may be true that additional time, expert staff, and budget would have allowed us to study other research questions in this test, those resources simply were not available. We believe we selected the most critical questions to research, and there is nothing in your report to support a conclusion that any of this research was unimportant, or that some of our research was less important than additional research you suggest. Hence, this report title seems unwarranted.

Second, over a year ago we met with you, Inspector General Frazier, and a number of Office of Inspector General (OIG) staff members to discuss the fact that we were having difficulty developing the automated instrument and applications for address canvassing. At that time, we also made it clear that we would soon have to decide if enough could be learned by going forward—even with an imperfect instrument—or whether we would have to cancel the test. We later decided to go forward with a goal of learning as much as we could, shared that decision with the OIG (and others), and discussed all of this again at your exit conference for the audit. Therefore, while many of the problems and issues you raise in your report certainly did arise during Address Canvassing, we are disappointed that the report provides none of this background or context for the general reader of the report.

Specific Comments

Page ii – We do not agree with the lead statement, “**Unreliable hand-held computers interfered with the test.**” What we were mostly trying to test was the feasibility of the concept of automating Address Canvassing. We had some other test and research objectives, and we originally wrote down some measures that we thought might be useful for quantifying changes, but we really just needed to get through a dramatically re-envisioned operation. The Hand-Held Computers (HHC) were the test. We do not mean to minimize the problems we had with creating an automated operation, but that particular statement misses the point. Reaching certain production numbers and receiving updates for all areas was not the real objective.

Page ii (and numerous sections throughout the document, including the first bullet on page 17) – You make the point that we should have been testing shifting U.S. Census Bureau delivery areas to postal delivery areas. It may be possible to use Address Canvassing data to help determine type of enumeration areas (TEA), and we are exploring that for the 2010 Census. However, there are a number of other critical factors that affect TEA delineation. For example, just because a structure has a street name and house number address does not necessarily mean that the United States Postal Service (USPS) recognizes and uses that address for mail delivery. Also, it is not operationally feasible to mix USPS and Census Bureau mail delivery in the same block or ZIP code.

Page 2 – “Each address and physical/location description in MAF has geographic coordinates that relate it to a location in TIGER.” This statement is not entirely accurate. At present, only areas that were designated as non-city-style during Census 2000 have geographic coordinates for

every address and physical location. However, the balance of Master Address File (MAF) addresses nationwide does not currently have geographic coordinates that relate them to a location in the Topologically Integrated Geographic Encoding and Referencing (TIGER) system.

Page 2 – Your statement that “if deleted addresses are verified as nonexistent, they are removed from the master address file” is inaccurate. The deleted addresses are not actually deleted from the MAF, but rather flagged as deletes from this operation.

Page 3 - "First opportunity...to evaluate...new methods for distinguishing separate living quarters...." We actually did this for the first time in the 2004 Test.

Page 6 - "Despite a lengthy testing program...." This statement is misleading and is used multiple times throughout the document. It leads the reader to believe that we had a “robust” testing program. The fact of the matter is that we implemented many tests over a 9-month period because we were unable to successfully complete each testing cycle due to software problems. Thus, we had no choice to expand the testing program.

Page 8 - "If Census wants to continue with its plan to GPS-align addresses for the decennial...." The Census Bureau will not "GPS-align addresses." The Census Bureau will capture a GPS coordinate at the location of each structure containing one or more addresses. The difference between an address and a structure, and the difference between aligning existing data and capturing new data cannot be overlooked.

Page 8 - "When GPS worked...." This statement suggests that GPS technology is somehow less than reliable, when the real issue was the reliability of the Census Bureau-developed GPS software. The same Census Bureau-developed GPS software was used in the 2004 and 2006 tests. The intermittent GPS availability, slow GPS performance, and inaccurately-calculated GPS coordinates on the HHC were caused by problems with Census Bureau-developed GPS software. Nothing about the GPS signal nor GPS hardware caused these problems. The 2006 Census Test experiences will be passed on to the Field Data Collection Automation (FDCA) vendor in the form of functional requirements for the 2008 Dress Rehearsal.

Page 8 – Your statement “for the 2006 test, Census programmed the HHC to make coordinate collection a mandatory step for listers and added a feature allowing them to zoom in on the HHC map and manually place a spot at the location of the address if the GPS function was not working” is inaccurate. Manual coordinates are always collected, not just when GPS is not working.

Page 9 - “As late as September 2005, the bureau had not developed a process for systematically identifying relevant information gleaned from the test that could affect FDCA....” This is not accurate—for example, we have the Address Canvassing Assessment. Also, the Geography Division maintains an in-house GPS testing and technical team that has conducted numerous GPS data collection tests and operations, as well as analysis of the 2006 Census Test results. The team has significant documentation available and is in the process of summarizing its recommendations for GPS usage in the 2008 Dress Rehearsal and 2010 Census. This team is

prepared to work with the FDCA contractor and other divisions on final HHC requirements as needed.

Page 11, Figure 4 – Outside of the issue that GPS coordinate forces you into a different location than what is indicated in TIGER, we do not know how having GPS coordinates makes the mapping issues worse. That road apparently was not realigned, and we probably do need unambiguous procedures for handling those situations. However, in general, the realigned TIGER is fixing map problems that before led to nearly intractable situations in the field.

Pages 15-16 (and throughout) – There seems to be a consistent confusion between assignment areas and blocks. Blocks are as they exist on the ground. We do not create blocks, except for with invisible boundaries for governments. So, a block cannot be composed of multiple blocks, and we do not have a block formation process or have anything to do with block complexity. For the block that is shown in Figure 9a, it is just a complex block. There is nothing we can or should be doing about that.

Page 16 – “The bureau’s Census 2000 evaluations indicated that 9.5 million addresses that received hand-delivered questionnaires could have received them through routine mail delivery.” Although the specific reference is not clear, this figure seems to have been derived from the number of addresses in these areas that were matched to an address on the USPS Delivery Sequence File (DSF). If so, the conclusion is very misleading because it does not take into account the fact that these addresses are not necessarily clustered. For example, just because 30 percent of the addresses in a block (or census tract or ZIP Code area) have addresses that can be found in the DSF, this does not mean the best way to conduct the census for that block would be to split delivery responsibility between the USPS and the Census Bureau.

Page 16, Table 3 – This table is inaccurate with respect to the 2004 Test. The Georgia test site was comprised of both Mailout/Mailback and Update/Leave areas (as defined in Census 2000), with about 50 percent in each. We did not end up doing Address Canvassing in Georgia, so we did not have the opportunity to test using the results of the canvassing for delineation.

Pages 19-20 – Your assertion that the inadequacy of the Quality Control Check (QC) Status Report (DD-959) left the “LCO staff unable to determine whether failures were due to lister errors, the QC design, software problems, or other factors” is inaccurate. Although the QC Check Status Report was inadequate for providing the level of detail the Local Census Office (LCO) staff needed for effective feedback and retraining purposes, that inadequacy did not create uncertainty as to whether or not the listers committed errors. The design of the QC was such that assignment areas were classified as having failed QC due to excessive lister errors. The report was lacking in the details regarding the lister errors made, but all four error categories provided on the report were, indeed, lister errors.

Page 20 – Your statement that Census Bureau officials “deliberately kept the QC failure criteria from regional and local staff on the assumption that knowing the criteria might cause staff to inadvertently influence QC results” is inaccurate. The regional and LCO managers had access to the full list of errors that the QC tracked and tallied. They were informed as to which of those errors were critical and noncritical. We make attempts to keep that level of detail from the listers themselves so they do not focus only on those aspects of their work, but we have never

withheld that information from the management chain. On the contrary, we believe the managers need to know that information so they can provide constructive feedback and effective training to their employees, which is why we also felt the DD-959 report was inadequate.

Page 21 – Your statement “the efficiency and accuracy of the quality control operation could be enhanced if the handheld computers captured whether the information was obtained by interview or only by observation” is partially inaccurate. While having information on whether an interview took place could be useful for resolving discrepancies, it certainly won’t improve the efficiency of quality control. On the contrary, before accepting a lister’s actions because he or she spoke to someone, the QC lister would need to speak with that person to verify that the lister indeed interviewed them and obtained the information in question. That would definitely require a longer process for the QC lister for that HU and could require callbacks, which would significantly decrease the productivity of the DQC operation.

Page 21, Recommendation 3 – We do not agree that obtaining interview(ee) information will “reduce the need to contact households more than once.” In fact, having such information and using it during QC could create the need for additional household contacts. The recommendation should be narrowed to just mentioning that the information could facilitate the quality control.

Recommendations 1-4:

1. *Enhance the reliability of automation in future tests and operational programs by*
 - a. *continuing to improve system development practices, and*
 - b. *using contractors to fill any staffing gaps or, when warranted, to handle system development.*
2. *Develop an adequate handheld computer capability for collecting address coordinates by*
 - a. *determining the factors that affect the reliability of GPS and accuracy of address coordinate collection, and*
 - b. *developing a plan for implementing and testing improvements so that this capability effectively supports decennial operations.*
3. *Ensure that the FDCA contract appropriately addresses automation issues identified in the 2006 test. These include system reliability, performance, and usability; GPS processing; and HHC street mapping capabilities.*
4. *Establish a process for timely analysis of test results and incorporating resulting requirements changes for address canvassing and nonresponse follow-up into the FDCA contract. If possible, incorporate changes to address canvassing requirements before contract award.*

Comments on Recommendations 1-4:

The Census Bureau recognizes the challenges and issues that it has experienced in the development of the applications for use on mobile computing devices for the 2004 and 2006 census tests. Our decision to outsource to industry for the development of both the hardware and software was based in part on this test experience. We implemented a different acquisition strategy for the FDCA project specifically for purposes of mitigating critical risks identified in this statement and throughout the remainder of the report. Our acquisition strategy involved the

conduct of a Technical Exchange process with the vendors competing for the contract. This Technical Exchange process allowed the vendors to meet separately with the Census Bureau for purposes of gaining a better understanding of our requirements, the decennial census environment, our census test experience, etc. Through this process, vendors defined the topics, issues, questions that they wanted to discuss with the Census Bureau. They also had an opportunity to discuss their design, software approach, and demonstrate incremental builds of their prototype for purposes of obtaining our feedback related to weaknesses or risks.

A second component of our acquisition strategy involved the development and testing of a prototype for Address Canvassing, which vendors competing for the FDCA contract accomplished at their own expense. This prototype mitigated some significant risks:

- 1) Allowed industry to develop and/or integrate the appropriate hardware and applications following their own proven processes, without the additional burden of contract management oversight;
- 2) Determined whether the use of mobile computing devices was feasible for the Address Canvassing operation without a large Census Bureau financial investment; and
- 3) Resolved the 2008 Census Dress Rehearsal Address Canvassing schedule issues by providing a working prototype at time of FDCA contract award.

Based on the results of the prototypes produced by industry, we believe that our acquisition strategy has successfully mitigated these risks. The success of the prototype for Address Canvassing, which includes the challenging integration of map and listing applications demonstrates that the Census Bureau made the correct decision for outsourcing the FDCA project.

5. *Determine why the TIGER map database contains nonexistent roads and develop approaches to eliminate such roads nationwide from the database by the 2010 census.*

Comment: There are TIGER streets in every county that are not real and do not appear on the ground. This is due to the various sources that have been used to update TIGER over the years (i.e., local governments, commercial sources, field listing). The Address Canvassing operation for the 2010 Census will be the mechanism to identify and flag for deletion any nonexistent roads currently in our database.

6. *Refine lister training to provide clear and effective instruction on when and how to correct maps and adjust routes.*

Comment: For this test, the capability to update maps was not implemented on the hand-held device, so this was not a matter of listers not doing it nor knowing *how* to do it. We agree that for the Dress Rehearsal and the 2010 Census, lister training should be clear.

7. *Provide computer prompts to aid listers in following procedures for deleting addresses, obtaining complete address information during the interview process, placing precise map spots, and canvassing complex blocks efficiently.*

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Comment: We will consider adding this functionality to our contractor-designed listing instrument as resources allow.

8. *Develop and implement a mechanism for alerting local Census officials about assignment areas that may be difficult to canvass.*

Comment: This is a good idea. We will examine how to implement it.

9. *Review the block formation process and reduce block complexity where possible.*

Comment: We will explore ways to reduce the size and complexity of collection blocks prior to the 2008 Dress Rehearsal.

10. *Develop and test methods for identifying additional areas for post office questionnaire delivery, and include such areas as trials in the 2008 dress rehearsal.*

Comment: It may be possible to use Address Canvassing data to help determine TEAs, and we are exploring that for the 2010 Census. However, there are a number of other critical factors that affect TEA delineation. For example, as mentioned in our comments above about the Delivery Sequence File [re: page 16 of your report], just because a structure has a street name and house number address does not necessarily mean that the USPS recognizes and uses that address for mail delivery. Also, it is not operationally feasible to mix USPS and Census Bureau mail delivery in the same block or ZIP code. These issues already are being explored by an interdivisional team within the Census Bureau.

11. *Design a comprehensive, targeted training course for quality control listers that imparts the skills and knowledge necessary.*

Comment: We will continue to try and improve our training materials for the 2010 Census based on what we have learned in these tests.

12. *Disclose enough information about quality control failures to production managers so that they can take timely action to improve their listers' work during address canvassing*

Comment: We believe we have done this, but will review our procedures and make improvements where needed.

13. *Consider equipping handheld computers with the capability to identify whether an interview was conducted to facilitate quality control and reduce the need to contact households more than once.*

Comment: We will include consideration of this, along with other possible enhancements, as resources permit.

14. *Complete the Tribal Governments Liaison Program handbook in time for the tribal liaison to review it and suggest changes prior to the end of the 2006 test.*

Comment: We will do this if possible. In any case, we will share the handbook with a number of stakeholders before it is final.

15. *Develop ways of measuring and evaluating the impact of partnership activities.*

Comment: We will continue to explore ways to do this, but this is very difficult to do. There are both direct and indirect benefits of such efforts, and they can only be measured accurately during an actual census. At the same time, the interactions with advertising and promotional efforts must be measured. Ideally, this would be done through some sort of controlled experimental design, but that approach is not possible during a census due to the actual, or perceived, differential effects on census coverage that might result.

16. *Ensure that a useable partnership database, or another resource to facilitate tracking partnership information, is in place for the 2010 decennial.*

Comment: This effort is already underway and will continue.

17. *Clarify the overtime policy.*

Comment: We will explore ways to do this and welcome any suggestions you might have related to this effort.

18. *Explore options for meeting the cell phone needs of some Census employees. Census may find it more efficient to rent or purchase cell phones for some of the employees to use and negotiate plan rates at the regional or national levels, and/or to set a specific dollar allowance to cover cell phone use.*

Comment: We will explore this recommendation.

19. *Prior to the decennial dress rehearsal, field-test different training approaches and class schedules and evaluate their impact on the staff's comprehension and performance.*

Comment: We lack the resources, both financial and staff, to do this type of testing before the Dress Rehearsal.

20. *Clarify the instructions for scheduling and assigning employees to the initial training sessions to ensure that to the extent possible, crew leaders train their crew.*

Comment: We will try to do this.

21. *Perform an analysis of the costs and benefits of 100 percent address canvassing and consider whether alternative, less costly strategies for developing the address list for the 2010 decennial are feasible.*

Comment: Anything less than 100 percent address canvassing in all areas will, by definition, result in some addresses being left out of our initial address list for the 2010 Census. We do not think that is acceptable and are surprised that the OIG thinks it might be. We had planned to test some alternatives this decade (e.g., to see if other operations could add the missing addresses), but funding for that testing was not available. Having lost the opportunity to test this in either the 2004 Census Test or the 2006 Census Test, we believe we cannot risk using any of those alternatives for 2010, so, must conduct address canvassing on a 100-percent basis.