

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

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***U.S. Census Bureau***

***Census 2010: Key Challenges to  
Enumerating  
American Indian Reservations  
Unresolved by 2006 Census Test***

*Final Report No. OSE-18027/September 2007*

***Office of Systems Evaluation***





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

SEP 19 2007

MEMORANDUM FOR: Charles Louis Kincannon  
Director  
U.S. Census Bureau

Preston Jay Waite  
Deputy Director  
U.S. Census Bureau

FROM: Elizabeth T. Barlow  
Acting Inspector General

SUBJECT: Final Inspection Report  
*2010 Census: Key Challenges to Enumerating American  
Indian Reservations Unresolved by 2006 Census Test*  
(OSE-18027)

Attached is our final report on the 2006 test of update/enumerate, conducted on the Cheyenne River Reservation in South Dakota. The report presents our evaluation of the test's conduct and outcomes, particularly with regard to the impact of the new query Census introduced for the purpose of improving the count of all household members (within-household coverage). We also looked at the success of the overall operation in accurately enumerating the reservation population.

Overall, we found the new query had little impact on reservation enumerations, ultimately leading to the addition of only one person. We also found that problems with the update/enumerate process, combined with the inability to complete the operation, seriously hindered the bureau's ability to improve the 2010 count of reservation populations. In most cases, those problems were caused by the poor quality of many of the maps and address lists provided by address canvassing and the lack of GPS navigation in this geographically challenging environment, a 2.8-million-acre reservation dotted with some 3,000 housing units on mostly unmarked roads.

In its response to our draft report, Census challenged our methodology, findings, and the bulk of our recommendations. We believe the bureau did not have a clear understanding of the focus, intent, and evaluation procedures used for this review, and have made significant modifications to the final report in order to clarify those areas.



We request that you provide us with an action plan describing the actions you have taken or plan to take in response to our recommendations within 60 calendar days of the date of this report. Please note that for certain recommendations, our discussion of the bureau's response presented after each finding highlights topics we would like the action plan to address.

We appreciate the cooperation and courtesies extended to us during our review by Census Bureau headquarters, and regional and field office personnel. If you would like to discuss this report or action plan, please call me at (202) 482-4661 or Judith Gordon, assistant inspector general for systems evaluation, at (202) 482-5643.

Attachment

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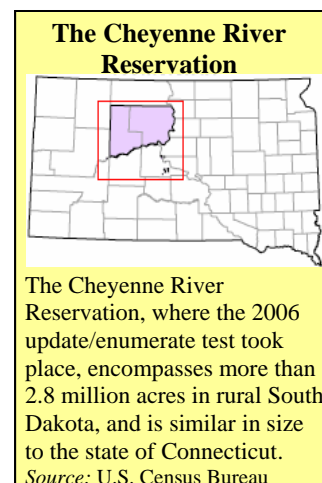
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## SUMMARY

In spring 2006, the Census Bureau tested the update/enumerate process it plans to use in the 2010 decennial census to count American Indians living on reservations, Alaska Natives, and other hard-to-find rural populations. During update/enumerate, Census staff go door to door to collect population data. They are also instructed to make any needed corrections to the bureau-generated maps and address lists they use to locate housing units. Census chose South Dakota's Cheyenne River Reservation as the site for the test—a choice we believe was a good one because it posed many of the challenges that have long hindered efforts to accurately count reservation populations: a severe housing shortage and large, rural geography punctuated by small communities that have mostly unnamed streets and unnumbered houses. Update/enumerate is an extremely labor-intensive operation that, in the 2000 decennial, counted 1.1 million households (of 116 million nationwide) at a cost of \$32 million.



American Indians have historically been undercounted in decennial censuses. Enumerating those who live on expansive, rural reservations is especially difficult because—in addition to having unmarked streets and houses—they often have high numbers of households in which several families share a single residence. When enumerators come knocking on Census Day, family members are often unwilling or unable to accurately report how many people actually reside at the address. To prompt a fuller accounting of such cases in 2010, Census has revised the “coverage” question on the enumeration questionnaire by adding a new query that specifically asks if other individuals or families reside in the home. It has also established a separate, downstream operation, called coverage follow-up, for collecting information from households that have been identified through the coverage question as potentially having additional members. These new approaches were put to the test on the Cheyenne River Reservation.

<b>Address Canvassing</b> <i>July – September 2005</i>	<b>Update/Enumerate</b> <i>March – May 2006</i>	<b>Coverage Follow-up</b> <i>May – August 2006</i>
Collects address and geographic location information for all housing units. This information is used in the subsequent update/enumerate operation.	Collects census information by conducting personal interviews at every housing unit. The operation also updates maps and address lists, and conducts various quality control checks.	Collects additional information to improve the population count. Staff telephone or visit individuals from selected housing units (e.g., all households that answered “yes” to a coverage question during update/enumerate).

### **OIG Review of Update/Enumerate Test Reveals Serious Weaknesses**

We evaluated the conduct and early outcomes of the update/enumerate test, taking a specific look at the impact of the new query on improving “within-household coverage”—that is, counting all members of reservation households—and the success of the overall operation in accurately counting the reservation population. We also assessed whether enumerators updated maps and address lists correctly and quality control staff provided an effective quality check of these revisions. Because the earlier address canvassing operation impacts update/enumerate, we

reviewed the accuracy and usability of the map and address information from this prior operation. We also reviewed the data from the subsequent coverage follow-up operation to ascertain whether Census was able to capture full enumeration information for additional individuals not counted during the update/enumerate process.

The direct costs of the 2006 update/enumerate operation were high: \$82 per housing unit enumerated. By comparison, the Census 2000 nationwide update/enumerate operation cost \$35 (in 2006 dollars) per housing unit.<sup>1</sup> Even recognizing that reservations like Cheyenne River may pose challenges not typical of the overall update/enumerate operation, we were prompted by this contrast in unit costs to question the efficiency and effectiveness of the methods and procedures tested for improving the count on American Indian reservations.

Our review revealed that the new query tested in 2006 had disappointingly little impact on reservation enumerations: despite the test's primary objective of finding more people, the new query identified only 16 households as having additional members, and coverage follow-up added only one person to these households. Given the high per unit cost for the tested update/enumerate operation and the meager results, it is clear that the bureau should rethink its approach and make well-designed changes to help improve the accuracy of reservation enumerations in the 2010 decennial. Our specific findings are as follows:

**Flaws in the Update/Enumerate Process, Combined with Failure to Complete the Operation, Undercut the Bureau's Ability to Improve the Reservation Count in 2010**

Cheyenne River Reservation, with about 3,000 housing units, was divided into 215 assignment areas, each of which needed to be enumerated and then pass quality control within a 12-week time frame. But 84 areas (39 percent) had not passed quality control by the operation's end, and our analysis of an enumeration data sample from both update/enumerate and the subsequent coverage follow-up identified a significant number of individuals who were not accounted for in either operation. Census's raw data from the test indicated that the reservation population had actually decreased since 2000, which seems unlikely. In fact, the bureau's own 2006 estimate of the reservation population showed a 3.9 percent increase.

We identified three key problems that caused frequent errors and so slowed the pace of update/enumerate that it could not finish within the 12-week time frame: (1) Unclear, inaccurate maps and incorrect address lists generated during address canvassing and supplied to update/enumerate staff made it nearly impossible for enumerators to find all housing units and for quality control staff to conduct their follow-up checks. (2) Update/enumerate staff did not have GPS technology to compensate for poor maps and address lists and help them navigate their assignment areas. (3) The multitude of errors made during enumeration caused a higher than expected number of areas to fail quality control and require recanvassing, which in turn, overwhelmed the quality control check and crippled the progress of the operation. (See page 8.)

**Changes Designed to Improve Coverage Yielded Negligible Increase in the Count**

Disappointed with the results from the 2000 decennial coverage question, the bureau decided it needed to revise the coverage question used in update/enumerate to better identify all household

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<sup>1</sup> Both dollar figures represent direct field costs and do not include headquarters costs and local census office infrastructure costs.

members in 2010. It did so by adding a query soliciting information about “other individuals or families staying” in the household for assessment in the 2006 test (see figure below). It also decided—for reasons not clearly documented—to enumerate individuals identified by this new query in the later coverage follow-up operation rather than on the spot, as had been done in Census 2000.

**Coverage Question Asked By Enumerators**

**Census 2000 Questionnaire**

**C1. I need to make sure I have counted everyone who lived or stayed here on April 1, 2000. Did I miss -**

- any children, including foster children?
- anyone away on business or vacation?
- any roomers or housemates?
- anyone else who had no other home?

☐ Yes - Add persons(s) to question 1, mark the “Add” box and ask questions 2-5. Correct the POP count in question 55 on the front cover.

☐ No - Continue with C2.

**2006 Census Test Questionnaire**

**C1. We do not want to miss any people who might have been staying here on April 1, 2006. Were there any additional people staying here that you did not include, for example:**


Children, such as newborn babies or foster children? . . . . . ☐ Yes ☐ No

Relatives, such as adult children, cousins, or in-laws? . . . . . ☐ Yes ☐ No

Nonrelatives, such as roommates or live-in baby sitters? . . . . . ☐ Yes ☐ No

Other individuals or families staying here? . . . . . ☐ Yes ☐ No

People staying here temporarily? . . . . . ☐ Yes ☐ No

 test query

*Source: OIG facsimile of Census forms*

As noted earlier, Census identified only 16 households with additional residents through the new query, and only one person in those households was added to the 2006 count.

One factor in the poor outcome may have been a failure to actually test the query. The majority of enumerators we observed never even asked respondents the new query, which was fourth in the list of five within the coverage question. They typically asked only the first or second query before checking “no” for all options. Because Census decennial managers did not adequately monitor enumerators conducting interviews in the field or their incoming questionnaires, the bureau did not realize enumerators were not asking the full question or that few households were being identified as having additional people still to be enumerated. Neither did the bureau have benchmarks against which to evaluate test results and identify problems as the operation progressed. And the timing of the coverage follow-up operation—which continued for 3 months after update/enumerate had completed—was another likely factor in the understated results, as respondents may not have recalled who was in the household so many weeks, or even months, earlier. (See page 18.)

## **Leadership Devoted to Transforming Census's Approach Is Needed to Improve the Count on American Indian Reservations**

Despite the difficult challenges to improving the count of reservation populations, the Census Bureau did not have any headquarters official whose principal responsibility was to plan and implement the 2006 update/enumerate test for American Indian reservations. Although many employees work on American Indian issues, no headquarters official was assigned leadership responsibility for the operation or charged with the singular task of improving enumeration on reservations for 2010. This may in part explain how little the bureau modified its traditional enumeration method for the 2006 test. We therefore question the priority and attention the bureau is giving to developing methods for reducing the undercount on American Indian reservations. (See page 22.)

### **What We Recommend**

In order to improve the count of reservation populations in 2010, we recommend that the Director of the Census Bureau assign a senior headquarters official specific responsibility for leading the effort to identify, implement, and monitor changes to the update/enumerate process on American Indian reservations. This effort should, at a minimum, generate actions designed to improve the address canvassing operation so that it produces better maps and address lists for update/enumerate staff. We offer several options for consideration in accomplishing this objective, including

- Improving update/enumerate maps by
  - ≈ adding current landmark information and community names,
  - ≈ providing clear assignment area boundary and location information,
  - ≈ placing small settlements in a single assignment area and ensuring small blocks contained in geographically large blocks are both visible and legibly labeled, and
  - ≈ developing a process to increase the scale for concentrated areas of housing units.
- Ensuring the address canvassing operation provides an appropriate level of information for the later operations by
  - ≈ verifying that every address field has an entry, and
  - ≈ identifying and prioritizing the important distinguishing structural characteristics to be used to describe housing units and emphasizing their importance in the training for reservation canvassers.
- Using handheld computers or an inexpensive off-the-shelf device equipped with GPS in conjunction with the housing unit GPS coordinate information obtained during address canvassing.

We also recommend that the bureau

- Modify quality control procedures for update/enumerate on American Indian reservations to better identify missed or duplicated housing units,
- Enhance enumerator training, supervision, and quality control to ensure that the coverage question is asked as intended, and

- Reconsider the decision to delay additional enumerations identified via the coverage question to coverage follow-up.

A summary of all recommendations can be found on page 25.

**Census Response and OIG Comments**

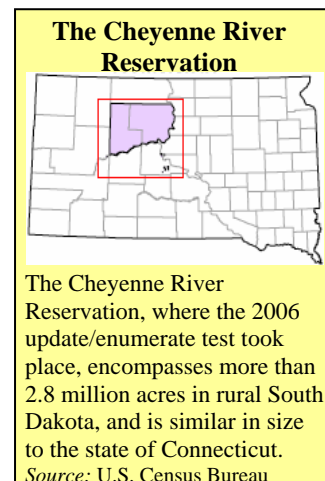
In responding to our draft report, Census challenged our methodology, findings, and the bulk of our recommendations. But we believe that much of its disagreement is based on a misunderstanding of our focus, intent, and evaluation procedures, all of which we have clarified in this final version. We summarize and address Census's major concerns in the corresponding sections of the report and attach the full text of its comments.



## INTRODUCTION

The Census Bureau conducted a partial census of population and housing, with Census Day occurring on April 1, 2006, 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. This 2006 census test sought to determine the validity and effectiveness of a variety of operations, procedures, and systems that are planned for the 2010 decennial census.<sup>1</sup>

Continuing the Office of Inspector General's evaluations of Census site testing for the upcoming decennial,<sup>2</sup> we reviewed the bureau's enumeration of the Cheyenne River Reservation, in which it tested a modified approach for improving how it counts residents in the overcrowded housing that is common on American Indian reservations. The issues and operations at the Travis County, Texas, site differ from those found on reservations and are not evaluated in this report.



### Background

American Indians have historically been undercounted in decennial censuses. The Census Bureau's overall objective for the Cheyenne River Reservation was to develop, test, and evaluate improved enumeration methods for American Indian and Alaska Native populations. Its specific focus was on improving "within-household coverage"—that is, counting all members of reservation households, which often contain a primary resident family plus additional families or individuals—and strengthening tribal relations.

#### American Indian and Alaska Native 2006 Census Test Objectives

##### Develop, test, and evaluate improved enumeration methods on an American Indian Reservation.

- A. To implement methods to improve within household coverage on American Indian Reservations.
- B. To implement a Tribal Liaison Program on American Indian Reservations.
- C. To develop, implement, and evaluate a consultation process with the Tribe and/or Tribal Leaders.

Source: Revised 2006 Census Test Project Management Plan, July 2006

<sup>1</sup> See the appendix for a list of all 2006 census test objectives.

<sup>2</sup> Previous OIG reports on Census site tests include *Enumerating Group Quarters Continues to Pose Challenges*, Report No. IPE-18046, September 2006; *Valuable Learning Opportunities Were Missed in the 2006 Test of Address Canvassing*, Report No. OIG-17524, March 2006; and *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.

To conduct the decennial census, the bureau identifies every place where people live or stay most of the time via its computer inventory of addresses and physical/location descriptions and its digital maps,<sup>3</sup> then either mails a questionnaire or visits every housing unit to obtain information about household members.<sup>4</sup>

The vast majority of our nation's households receive and return the census questionnaire by mail. However, certain American Indian reservations and rural areas are not candidates for mailed questions either because housing units in these communities do not have house number and street name mailing addresses or are otherwise hard to locate and count. In these cases, temporary Census employees visit every household and collect the census information through a doorstep interview. In Census 2000, this labor-intensive operation, called update/enumerate, counted 1.1 million households (out of 116 million nationwide) at a cost of \$32 million.

### ***Update/Enumerate Process Tested at the Cheyenne River Reservation***

The 2006 test of update/enumerate operated largely as it would during an actual decennial, with managers, office staff, and enumerators working under realistic production deadlines and pressures. The bureau does not certify population counts taken for the 2006 test or release other data products to the public, but subjects the enumeration data to internal evaluations intended to inform decisions for the 2010 census. For the 2006 census test, the bureau established a field office on the reservation, which was managed by the bureau's Denver Regional Office. During the decennial, the closest office will be in Rapid City, South Dakota, over 100 miles away.

Although this review focuses on update/enumerate, the earlier address canvassing operation impacts the enumeration, and the subsequent coverage follow-up operation verifies results. Below is a summary of the three operations.

<b>Address Canvassing</b> <i>July – September 2005</i>	<b>Update/Enumerate</b> <i>March – May 2006</i>	<b>Coverage Follow-up</b> <i>May – August 2006</i>
Collects address and geographic location information for all housing units. This information is used in the subsequent update/enumerate operation.	Collects census information by conducting personal interviews at every housing unit. The operation also updates maps and address lists, and conducts various quality control checks.	Collects additional information to improve the population count. Staff telephone or visit individuals from selected housing units (e.g., all households that answered "yes" to a coverage question during update/enumerate).

Address canvassing is a method of systematically traveling every street in an assignment area, block by block, to find and record information about every place where people live or could live and to update and correct the map of the assigned area. Address canvassing staff, using handheld computers with mapping capability and global positioning system (GPS) technology, attempted to verify the address and location of all housing units on the reservation to ensure the bureau's

<sup>3</sup> The address lists and location descriptions are known as the "master address file." The maps are known as TIGER<sup>®</sup> maps, short for the Topologically Integrated Geographic Encoding and Referencing system that produces them.

<sup>4</sup> Title 13 of the United States Code authorizes the Census Bureau to conduct censuses and surveys and requires that any information collected from the public under the authority of Title 13 be maintained as confidential. Examples of census test data in this report have been altered to comply with Title 13.

address file and digital map database were current and complete. The GPS technology allowed canvassers to trace their movement on a map to an address and—for every housing unit—place a “map spot” indicating it on the map and collect that location’s latitude and longitude coordinates. Canvassers also used the handheld computers to add (1) road names to the TIGER<sup>®</sup> maps and (2) housing unit locations and descriptions to the address fields.

In preparing for update/enumerate, Census used the location information on 3,053 housing units from address canvassing and divided the reservation into 215 assignment areas, each to contain a manageable number of housing units. An assignment area could be a single TIGER<sup>®</sup> “block” (a geographic area bounded by roads, rivers, or invisible lines such as county borders) if it contained a sufficient number of housing units; otherwise it was a combination of adjacent TIGER blocks. Each enumerator was initially given one assignment area; upon its completion, a second would be assigned, a process that continued until all had been assigned.

Using paper maps and address lists, enumerators traversed their assignment areas and obtained household member information via paper questionnaires, submitting completed ones to the reservation field office daily. Their primary task during update/enumerate was to collect resident information from all housing units in their assignment areas as of April 1, 2006. But they were also instructed to correct, add, or delete addresses and revise maps to reflect changes that had occurred since address canvassing, such as housing built or demolished. Once enumerators finished an assignment area, they submitted the address lists and maps to the field office for review by quality control staff.

The quality control program consisted of three operational components. First, the quality control staff conducted a follow-up interview for a sample of households assigned to each enumerator to verify that the required interview had been conducted and to independently collect information to be compared to results of the original interview. Second, for each assignment area, using the same paper maps and address lists as the enumeration staff, the quality control staff conducted a quality check of the address updating results by canvassing eight consecutive housing units beginning at a randomly assigned start address.<sup>5</sup> Third, also for each assignment area, quality control staff verified all deleted housing units and house number changes, as well as duplicates.

If critical discrepancies were found in the quality check, the assignment area was sent back to the enumeration staff and the entire area recanvassed. Interviews were only conducted at housing units identified as having been missed during the original enumeration. This recanvassing was subject to another quality check. If the area failed again, it was recanvassed one final time.

The coverage follow-up operation uses the update/enumerate results to determine households whose members may have been under- or overcounted. For Cheyenne River, about 500 housing units were selected to undergo this operation because they appeared to have duplicate or missed persons or contained other incorrect data. To collect the best information available, these housing units were reinterviewed in their entirety.

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<sup>5</sup> Census refers to this process, in which quality control staff compare enumerators’ address updates against their own observations, as the *dependent quality check*.

The cost of the 2006 update/enumerate operation—\$82 per enumerated housing unit—was high. By comparison, the Census 2000 nationwide update/enumerate operation cost \$35 (in 2006 dollars) per housing unit. Even recognizing that reservations like Cheyenne River may pose challenges not typical of the overall update/enumerate operation, we were prompted by this contrast in unit costs to question the efficiency and effectiveness of the methods and procedures tested in improving the count on American Indian reservations.<sup>6</sup>

### **Census Response and OIG Comments**

In responding to our draft report, the bureau complained that we had focused on only one of three objectives developed for its test site at Cheyenne River, and had therefore overlooked other efforts made by the bureau to improve coverage on American Indian reservations. We did, in fact, limit our review to evaluating the bureau's success at "implementing methods for improving within household coverage" because this objective dealt with the actual enumeration, whose conduct and results lend themselves to impartial evaluation. The bureau's remaining two objectives were to implement a liaison program and consultative process with the tribe. The impact of such efforts on the success of update/enumerate is difficult to gauge, and no matter what value these components might add, they cannot compensate for flaws in the mechanics of the operation that may prevent enumerators from completing their assignment areas and quality control staff from completing their checks. Therefore, we focused on the objective that we believed would offer the bureau the most useful input for ensuring a successful reservation count in 2010.

Census also stated in its response that we incorrectly described the components of its quality control program, and we revised our description accordingly.

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<sup>6</sup> Both dollar figures represent direct field costs and do not include headquarters costs and local census office infrastructure costs.

## OBJECTIVES, SCOPE, AND METHODOLOGY

Our evaluation focused on whether the tested operation succeeded in improving both overall enumeration on the reservation and within-household coverage. To that end, we assessed (1) the bureau's success at obtaining complete and accurate enumerations in update/enumerate areas, and (2) the effectiveness of update/enumerate and address canvassing in improving the address lists and maps.<sup>7</sup>

With respect to Census's specific objectives, we focused on its efforts to improve methods for actual counting of American Indians on reservations during the update/enumerate operation.

The cornerstone of our methodology was the extensive fieldwork and analysis detailed in the following paragraphs, combined with an examination of instruction and training documentation, evaluations of prior related operations, Census 2000 data, Census population estimates, and related literature.

**Fieldwork:** While update/enumerate was in progress, two OIG staff members spent a total of about 25 days at the Cheyenne River Reservation observing enumerators and quality control staff conducting their work activities in 21 of the 215 assignment areas. During this fieldwork, we observed 17 production interviews and eight quality control assignments. Enumerators and quality control staff were not pre-selected; rather we accompanied them in doing their work assignments as we were able to coordinate with their schedules.

After observing that many of the enumerators we accompanied had trouble finding their assignment areas and rarely asked the modified test question that was intended to identify all individuals within a residence, we augmented our fieldwork with additional analysis:

- We compiled production statistics from periodic workload and management reports for the 215 assignment areas to determine whether the production and quality control phases were completed on time.
- We analyzed questionnaire data received on the 8,211 persons identified by update/enumerate and the 1,578 persons identified by coverage follow-up to determine response rates for the test question and where duplication may have occurred.
- We selected 12 assignment areas from both sparsely and densely populated locations that exhibited the types of problems we observed in the field during the operation and also found for the majority of the reservation when we examined operational records. Using satellite imagery and duplicate questionnaire data, we assessed the accuracy of their address lists and maps.

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<sup>7</sup> Our review began with a third objective, assessing the bureau's progress in improving the method for designating update/enumerate areas. However, we deferred this objective because the Census group responsible for designating these areas had not formed at the time of our review.



Our map and address list analysis indicated that many housing units may have been missed, so we returned to Cheyenne River Reservation after all operations had concluded to compare what we could observe on the ground against the collected data. We canvassed 500 miles of roads in the 12 assignment areas. We reviewed the accuracy and usability of map and address information developed by address canvassing and then examined the map modifications made by enumerators and quality control staff, and the units that they added, deleted, verified, missed, duplicated, or designated as uninhabitable. Web-accessible satellite imagery together with the TIGER maps helped us plan how we would traverse the site, and an off-the-shelf, mobile GPS device helped us navigate while we were there.

During the course of our evaluation, we met with Denver Regional Office officials to discuss the progress of the operation. We also observed the office's quality review of enumerators' completed questionnaires and modified address lists and maps before they were accepted and sent to data entry or rejected and returned to the Census field office for rework. At the conclusion of update/enumerate, we met again with Denver staff to obtain their overall assessment of the operation. At Census headquarters, we met with decennial and field managers and staff, discussing map, quality control, and coverage issues as they surfaced during our review. We shared our preliminary findings with senior Census staff on February 23, 2007.

The Office of Inspector General conducted this review in accordance with the Quality Standards for Inspections issued by the President's Council on Integrity and Efficiency, dated January 2005, and under the authority of the Inspector General Act of 1978, as amended, and Departmental Organization Order 10-13, dated August 31, 2006.

### **Census Response and OIG Comments**

The Census Bureau challenged our methodology in several respects. It disputed our decision to observe only 17 interviews when there are approximately 3,000 households on the test site, claiming that our conclusions inappropriately generalized from a non-representative sample. We had no control over the interviews we observed, but simply accompanied available enumerators as they performed their assignments. We also went out on two separate, lengthy trips to observe different enumerators at different times of the operation. Serious problems were evident from our observations, which prompted us to analyze *all* the test enumerations to substantiate our findings. For example, we tallied only 16 "yes" answers to the test query out of the test enumerations for all 3,000 households, and we searched all 8,200 update/enumerate and 1,600 coverage improvement enumerations and found that only *one additional person* had been counted as a result of the new query. We also found that 13 percent of the enumerators themselves had not been counted. These inadequate results were consistent with our observations in the field and provide us with a sound basis for turning to our enumerator observations for insight.

Census also took exception to our selection of only 12 assignment areas for close scrutiny, stating that our sample was biased because the chosen areas were likely to exhibit the problems we were observing. The 12 assignment areas we scrutinized exhibited problems that were typical and widespread throughout the reservation: after analyzing assignment area completion rates and extensively reviewing enumerator address notes for all areas, we selected sparsely and densely populated assignment areas that would enable us to evaluate the circumstances under which

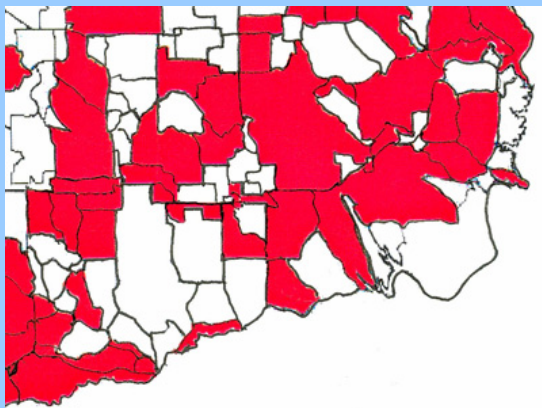
problems were encountered and reasonably gauge the effects. Because of time constraints we were unable to review all assignment areas, but again we maintain that the assignment areas typify the pervasive problems shown by our analysis: 84 of all 215 areas never passed the bureau's own quality control and others had inaccuracies despite passing quality control. The fact that 39 percent of the assignment areas did not complete the operation prompted us to meticulously analyze what in our judgment were clear examples of common challenges faced by the enumerators so we could bring them to the attention of Census management and recommend solutions.

Finally, Census incorrectly stated in its response that it does not have access to the satellite imagery or independent listings we used to draw conclusions about coverage errors made by Census staff and therefore cannot verify the accuracy of our findings regarding areas with missed housing units. However, in a November 3, 2006, meeting attended by OIG, Geography Division staff, and others, Census superimposed TIGER maps onto satellite imagery, a superior capability that OIG does not have, which enabled all present to see the missing housing units that we found. As for the independent listings, the list of enumerators working on Census Day that we used was obtained from the reservation field office and verified against management reports generated at headquarters. Census could easily use these same tools to corroborate our findings on the housing units not found and the enumerators not counted.

## FINDINGS AND RECOMMENDATIONS

### I. Flaws in the Update/Enumerate Process, Combined with Failure to Complete the Operation, Undercut the Bureau's Ability to Improve the 2010 Count of Reservation Populations

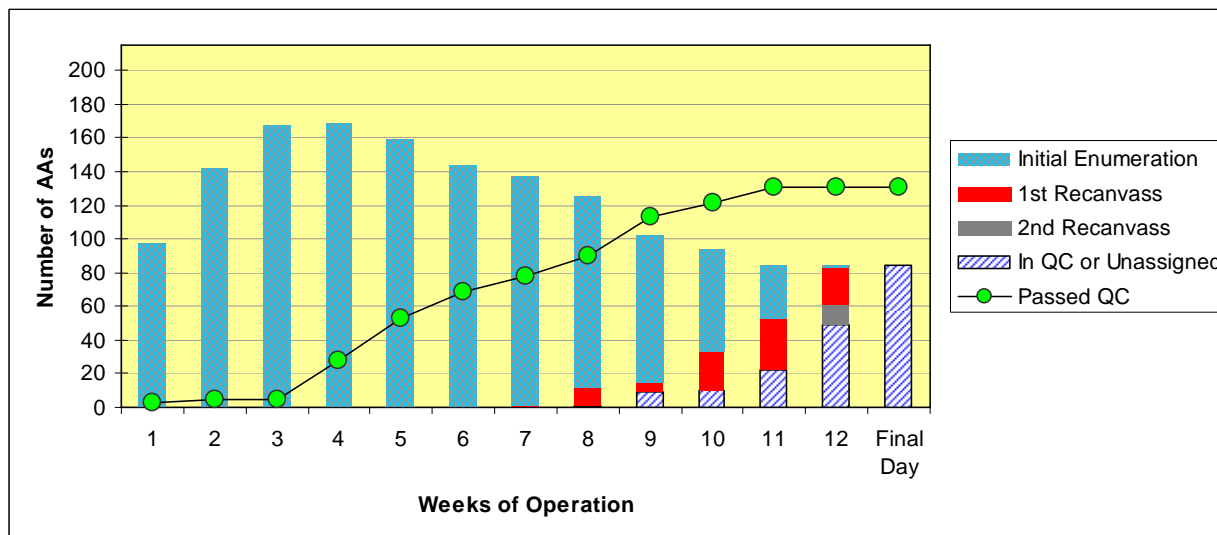
**Figure 1. Incomplete Assignment Areas in Red**



Source: Census map with OIG annotation

The Census Bureau divided the Cheyenne River Reservation into 215 assignment areas—giving a staff of about 120 enumerators an average of 2 areas each to complete during the 12-week operation. But the update/enumerate process was never completed because 84 assignment areas did not pass quality control—10 of these were not enumerated in time to undergo a quality review. The remaining 74 had failed quality control once and some even twice, but time ran out before they went through a final quality control check. In the end, the operation had a dismal 61 percent completion rate. Figure 1 shows the broad swaths of the test site where Census did not complete update/enumerate. Figure 2 shows the time line, the progression of the operation, and points in the process where trouble began.

**Figure 2. Weekly Status of Assignment Areas**



Source: OIG-compiled Census Bureau data

As figure 2 illustrates, as late as week 9, more than 80 assignment areas were still in “initial enumeration” and yet to be subjected to the quality check. By the following week, the operation

clearly began to stall as the cresting QC line indicates, and never recovered as staff got bogged down trying to recanvass and do quality checks of increasingly difficult areas.

Our analysis of update/enumerate data uncovered two obvious indicators that a substantial number of people were likely missed during the count: first, our review of the enumeration files found that 13 percent (16 of 120) of the enumerators—themselves reservation residents—were not listed as having been counted during the update/enumerate and subsequent coverage follow-up operations.

Second, Census's raw enumeration data<sup>8</sup> from the test showed a decreased population count from the 8,491 recorded in Census 2000 (for Dewey and Ziebach counties, which comprise the reservation). Yet sources familiar with the demographics of the Cheyenne River Reservation believe it is unlikely that the population is actually decreasing. Indeed, the bureau's own 2006 population estimate of 8,818, which includes births, deaths, and migrations, shows a 3.9 percent increase over 2000.

Our review identified several problems at the root of these symptoms that, if not resolved, will likely hinder the bureau's ability to obtain the best possible count on American Indian reservations in 2010:

- Unclear, inaccurate maps and incorrect address lists—produced during the preceding address canvassing operation—made it nearly impossible for enumerators to find all housing units and for quality control staff to conduct their follow-up checks.
- Lacking the GPS technology that was used in the earlier operation, update/enumerate staff had no tools to compensate for the poor maps and guide them through their assignment areas.
- The multitude of errors made during enumeration overwhelmed the quality control check and recanvassing efforts with unanticipated numbers of failures and consequent delays in completing these secondary phases of the operation.

***A. Address Canvassing's Failure to Adequately Improve Maps and Housing Unit Descriptions Caused Inefficiencies and Errors***

As we traversed portions of 12 reservation assignment areas containing a total of 480 housing units during our postoperation fieldwork, we found 35 units that were never enumerated. Twenty-five of these were not even on the map. For the remaining 10, enumerators misidentified the target housing unit and enumerated the wrong household, thereby creating duplicate enumerations. And these 35 housing units were not enumerated during the subsequent coverage follow-up operation. During update/enumerate, we observed that enumerators had difficulty finding their assignment areas, reading the map spots (which represent individual housing units), and associating address descriptions with the correct housing unit because address canvassing did not adequately improve maps and housing unit descriptions. Moreover, maps of some

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<sup>8</sup> Raw enumeration data undergoes internal checks and edits and is subject to change. Only raw enumeration data was available at the time of our analysis.

assignment areas were virtually illegible because of overlapping and undecipherable map spots. With more than 7 percent of housing units potentially missed in these 12 assignment areas, it is our opinion that a significant portion of any undercount experienced on American Indian reservations may well be attributable to poor maps and address lists and the consequent inability of enumerators to locate housing units.

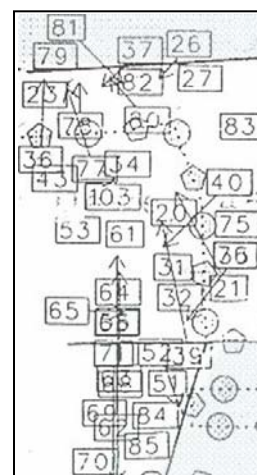
### **Unclear, inaccurate maps disrupted enumerator progress and caused errors.**

**Poorly defined landmarks and boundaries.** The bureau had to form assignment areas out of a 2.8 million acre reservation containing just over 3,000 housing units and few marked roads. In a terrain of rolling prairies and dry river beds, and with some assignment areas as large as 200 square miles, field staff relied heavily on landmarks—airports, campgrounds, cemeteries, hospitals, churches, and schools—to help determine where they were. But many of these features were not adequately portrayed on the maps or were not included at all because address canvassers were not required to update them. While the maps contain some landmark symbols, bureau officials told us that they have not updated most landmarks in 20 or 30 years, and that systematically updating landmarks would be too expensive. Officials noted that if landmarks happen to have been hand-drawn on the maps, the bureau may use this information to revise TIGER. Maps that do not correctly depict landmarks are not especially useful in remote areas such as the Cheyenne River Reservation. The absence of current landmark information hampered enumerators' efforts to reliably ascertain their location with respect to their assignment area. The investment in improving addresses is diminished if enumerators still cannot find the correct housing units.

The reservation contains a dozen or so small communities with 10 to 50 housing units each. However, their commonly known names are not on the maps because the communities are not Census-designated places.<sup>9</sup> As a result, enumerator maps often consisted of a stretch of highway and a cluster of housing units or a partial cluster (if a community was divided into two assignment areas) rather than familiar areas with recognizable boundaries. Enumerators were unable to use their local knowledge to find their assignments.

The bureau's canvassing procedure requires staff to systematically travel all streets, roads, and paths in each block in a clockwise direction, comparing housing units on the ground with those on the maps. But in the frequent case in which one or more assignment area boundaries were unmarked, nonexistent, or otherwise difficult to find and had inaccurately portrayed landmarks, enumerators could not determine where to start canvassing. They consequently resorted to traversing from map spot to map spot, which caused them to miss some housing units. A number of the missed or duplicated housing units we identified were along such boundary lines.

**Figure 3. Illegible Map**



Source: TIGER

<sup>9</sup> A Census-designated place is an area identified by the bureau for statistical reporting. Census-designated places are communities that lack a separate municipal government but that otherwise resemble incorporated areas such as cities or villages.

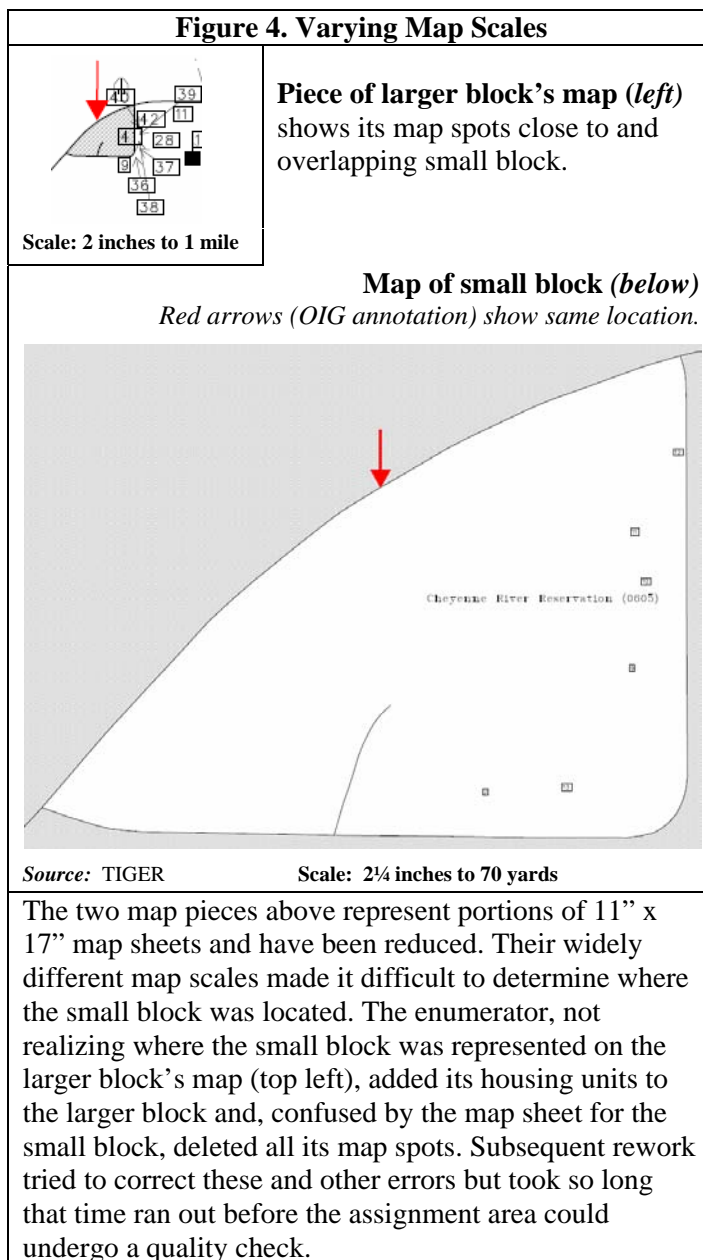


**Map scale problems.** Unlike in urban areas, road boundaries on the reservation created geographically large empty spaces punctuated by clusters of housing, which posed map scale challenges. If the map scale is too small, clusters of housing units are compressed, rendering the map spots unreadable (see figure 3). Several assignment area maps we examined showed large blocks containing clusters of unreadable map spots. Some enumerators spent an inordinate amount of time redrawing such maps by hand in an attempt to associate the correct housing units with the appropriate map spots. They were often unsuccessful and introduced errors. Bureau officials told us the trade-off for readable map scales is an unmanageably large number of maps versus fewer maps with legibility issues. But we question the value of sacrificing legibility for fewer maps—enumerators are bound to make errors if they have maps they cannot read.

We also found instances in which large blocks obscured small interior blocks, confusing enumerators because the map scales varied significantly from map to map. In one large assignment area of about 150 square miles, enumerators were unable to associate the small block's map with a geographic location, particularly without landmarks to help guide them, and thus residents were enumerated as part of the larger block (see figure 4).

Clearly, enumerators need better maps in remote update/enumerate sites to navigate large assignment areas, especially if they do not have GPS aids. In addition to GPS, the handheld computers used in address canvassing were equipped with a zooming capability, allowing enumerators to view different levels of map detail as needed. Although the TIGER® database is undergoing a redesign, bureau officials said the upgrade will not overcome map scale problems but will make maps more readable.

For areas where paper maps are used, we urge the bureau to establish a systematic process for the 2010 decennial to identify areas where paper map scales should be revised. It should also assess



the costs and benefits of having address canvassing add and update landmarks and other features, such as commonly known community names, to the maps for update/enumerate areas. Spending the time up front to produce useable maps could improve accuracy and timeliness, while reducing the costs of update/enumerate as a whole.

### Address information collected in address canvassing was inadequate.

Without reliable maps and GPS assistance, enumerators were left with the address canvassing addresses and physical descriptions to guide them to the correct housing unit. Our review found that the address lists remained in flux throughout update/enumerate as enumerators and quality control staff made numerous modifications to street names, zip codes, and physical descriptions (see table 1).

**Table 1. Address Changes Made in Update/Enumerate**

**For 70 housing units in 12 assignment areas**

**Street Names**

Address canvassing:	29 added
U/E production:	12 added or changed
U/E quality control:	31 added or changed

<b>Total U/E changes:</b>	<b>43</b>	<b>60%</b>
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**Zip Codes**

Address canvassing:	8 added
U/E production:	14 added
U/E quality control:	47 added

<b>Total U/E changes :</b>	<b>61</b>	<b>90%</b>
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**Physical Descriptions**

*Exterior colors, existing garage or deck, orientation (e.g., facing north), distance from road, etc.*

Address canvassing:	66 added
U/E production:	11 changed
U/E quality control:	34 changed

<b>Total U/E changes :</b>	<b>45</b>	<b>60%</b>
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Address canvassers had been instructed to enter addresses and describe each housing unit as well as mark its location on the map using their handheld computer's GPS capability. With street names and house numbers often not posted, canvassers had to collect that information via interviews, but they did so inconsistently.<sup>10</sup> They also focused more on collecting GPS readings and less on keying in address information. They thus often did not meticulously collect street name and zip code information during the interviews and omitted readily recognizable and distinguishing structural characteristics ("two stories, detached garage"). Marred by vague descriptions and missing information, many addresses provided by address canvassing were of little use to enumerators—who did not have the benefit of GPS—in identifying correct housing units.

Although zip codes were one of the five data fields that could be entered on the handheld

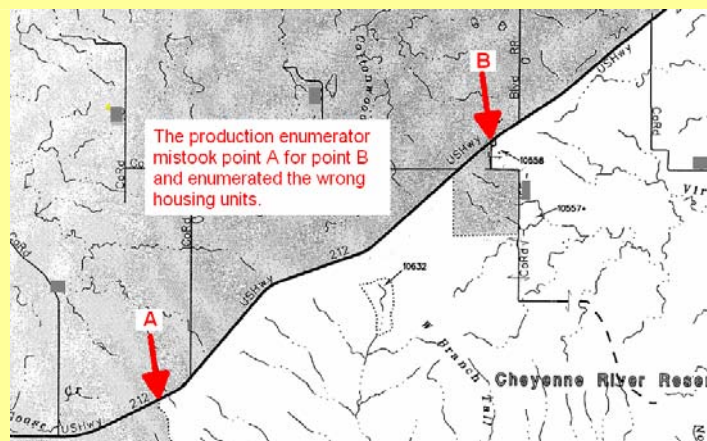
computer for the 2006 test's address canvassing operation, almost 90 percent remained blank. According to bureau officials, collecting zip codes is not important. However, with maps lacking landmarks and community names and with few known street names, we observed that, in practice, zip codes helped enumerators associate the address description with a specific community. In some instances, zip codes became a surrogate for a community name.

<sup>10</sup> *Valuable Learning Opportunities Were Missed in the 2006 Test of Address Canvassing* - Evaluation: Census-OIG-17524-03-06, p. 16.

***B. Without GPS Assistance, Completing Assignment Areas Was Extremely Difficult, Inefficient, and Error-Prone***

Update/enumerate on American Indian reservations often calls for finding housing units multiple times<sup>11</sup> in areas where street names and house numbers may not be physically posted and housing units difficult to locate. In addition, forming easily traversable blocks and assignment areas using rural roads and boundaries can be extremely challenging. Yet update/enumerate in the 2006 test did not employ handheld computers equipped with GPS navigation, but instead used traditional paper maps and address lists. In contrast, the bureau tested GPS capability for nonresponse follow-up enumerations in areas having the easier-to-find city-style addresses, whose households receive their questionnaires by mail.

**Figure 5. Assignment Area with Multiple Errors**



Four people attempted to sort out this area, resulting in inefficiencies and numerous errors:

- 4 housing units incorrectly deleted by first enumerator
- 2 other housing units' enumerations duplicated by enumerators from different assignment areas
- 4 deleted housing units reinstated and enumerated by quality control
- 1 missing housing unit map-spotted and enumerated by quality control
- 2 map-spotted housing units never enumerated
- 3 missing housing units never map-spotted and thus never enumerated

Source: TIGER (some road names concealed and OIG annotations added), OIG observations

Having observed both the address canvassing and update/enumerate operations on the Cheyenne River Reservation, we have firsthand knowledge of the benefits of GPS navigation in this difficult area. Address canvassers relied heavily on GPS to lead them around their assignment areas and to find the correct housing unit. In update/enumerate, enumerators did not have GPS and often became lost, resulting in wasted time and inaccurate enumerations (see figure 5).

In 2005 the bureau decided to use handheld computers for address canvassing and nonresponse follow-up as a principal means of improving accuracy and efficiency. But after further analysis, the bureau concluded that it was too risky to manage technology development for many concurrent applications within the decennial schedule constraints and decided not to use handhelds for data collection operations that had relatively

small impacts on the total decennial budget—such as update/enumerate. Census did not evaluate the alternative of using handheld computers in update/enumerate solely for navigation.

After observing enumerators routinely getting lost, we met with decennial managers and discussed this problem, along with the benefits of using GPS technology to resolve it. They

<sup>11</sup> Enumerators attempt to make up to six visits to speak with a resident, quality control staff performs a quality check on eight houses, and enumerators can potentially recanvass the entire assignment area two more times.

acknowledged that using handheld computers only for GPS navigation would help the operation without unduly adding risk, but stated that funding would not allow it. In our view, however, an investment in GPS could quickly pay for itself: our observations make it reasonable to conclude that update/enumerate's high costs per unit on the Cheyenne River Reservation resulted in part from time wasted as enumerators tried to locate their housing units with inadequate maps and address lists. If they could find them faster and more directly, both mileage and salary costs per unit would drop, and in the case of Cheyenne, the operation might have been completed on time and with fewer errors. With reliable off-the-shelf GPS products costing little more than \$100, making them available to enumerators—in conjunction with adding latitude and longitude coordinates to address lists—could significantly cut unit costs and allow the bureau to quickly recoup the up-front outlay.

**C. The Quality Check of Updated Maps and Address Lists Was Unable to Handle the Multitude of Errors It Encountered**

As mentioned earlier, in each area enumerated, quality control staff canvassed eight consecutive housing units, checking that the enumerator correctly verified and updated the address lists and maps. An assignment area failed quality control and was sent back for recanvassing if the address list had any one of the following critical errors: a missed housing unit, an incorrect street name, or a misplaced map spot. The success of the quality check relies on how accurately and quickly staff identifies errors and sends failed assignment areas into the recanvassing pipeline.

Ten of the 12 assignment areas we examined failed the quality check—each with critical errors ranging in number from three to eight, when only one is needed for failure. A similar level of excess errors, if generally occurring in the large percentage of the reservation assignment areas that were failing, would explain why the staff was so burdened that a week had to be added to the operation. Even with an extra week, 84 assignment areas remained unfinished—they had either failed quality control or were not enumerated in time to undergo a quality review (see table 2).

**Table 2. Quality Control (QC) Progress**

Initial Production 215 AAs		
QC		No QC
205		10
117 Pass	88 Fail	
1 <sup>st</sup> Recanvassing 88 AAs		
QC		No QC
27		61
14 Pass	13 Fail	
2 <sup>nd</sup> Recanvassing 13 AAs		
QC		No QC
0		13
Remaining Workload		84

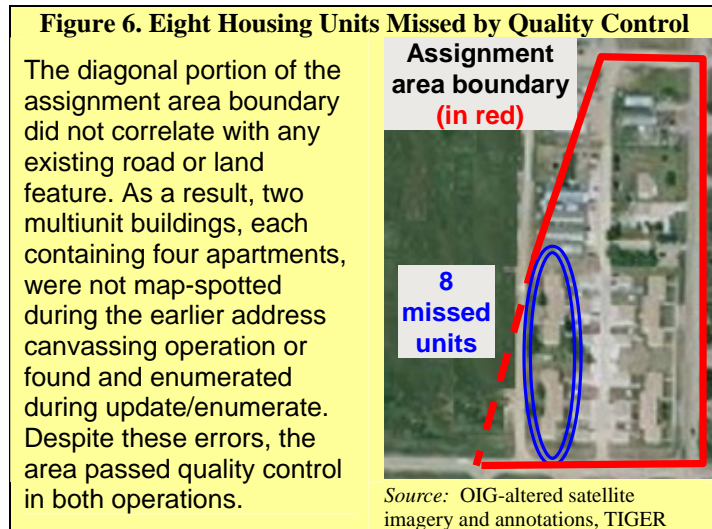
Bureau officials acknowledge problems with the quality check and intend to review the error definitions, which they claim may have been too broad. While this matter warrants a review, redefining what constitutes a critical error may not fix the quality control operation's inability to identify the kinds of problems we found in substantial numbers. Through analysis of duplicate enumerations, we found 10 instances in which quality control did not indicate, and presumably did not detect, that an enumerator had canvassed the wrong location and enumerated the wrong housing unit while missing the correct one. In other cases, both enumerators and quality control missed units and thus never added them to the map. For example, in our postoperation fieldwork, we identified eight missing housing units in one assignment area that passed both address canvassing and update/enumerate quality control (see figure 6, below). So while the quality check and recanvassing did correct some missed enumerations and made meticulous address



corrections, they fell behind and, in the end, could not compensate for the systemic problems in the process.

The bureau must ensure that enumerators have the tools they need to enumerate correctly the first time. Unlike easy-to-navigate city-style blocks, assignment areas and blocks on the

reservation are hard to recognize. They are also often large and contain ambiguous boundaries—such as roads that are hard to locate or unmarked county lines. And they may contain small blocks that are difficult to find because they are carved out of much larger blocks. The bureau should consider providing additional information about neighboring assignment areas to help enumerators find their location. This would be particularly helpful for areas containing invisible boundaries where we found many of the missed and incorrectly enumerated households.



### Recommendations

The Director of the Census Bureau should ensure that 2010 decennial managers do the following in connection with update/enumerate operations on American Indian reservations:

1. Analyze and document the most cost-effective way to give update/enumerate staff the tools they need to easily traverse assignment areas and identify housing units. The bureau should consider the following options:
  - Improving update/enumerate maps by
    - ≈ adding current landmark information and community names,
    - ≈ providing clear assignment area boundary and location information,
    - ≈ placing small settlements in a single assignment area and ensuring small blocks contained in geographically large blocks are both visible and legibly labeled, and
    - ≈ developing a process to increase the scale for concentrated areas of housing units.
  - Ensuring the address canvassing operation provides an appropriate level of information for the later operations by
    - ≈ verifying that every address field has an entry, and
    - ≈ identifying and prioritizing the important distinguishing structural characteristics to be used to describe housing units and emphasizing their importance in the training for reservation canvassers.



- Using handheld computers or an inexpensive off-the-shelf device equipped with GPS in conjunction with the housing unit GPS coordinate information obtained during address canvassing.
2. Modify update/enumerate quality control procedures to better identify missed or duplicated housing units, for example, by conducting quality control checks across assignment areas.

### **Census Response and OIG Comments**

The bureau attributed most of the problems enumerators encountered in the field to flaws in the earlier address canvassing operation, and stated that since there was no specific test objective for the update/enumerate methodology, the failure to complete all assignment areas does not mean the test failed. Regarding the first point, we note that a major portion of our first finding discusses address canvassing's role in the poor performance of update/enumerate and encourage the bureau to implement procedures for enhancing the quality of the maps and address lists produced by that operation. As for the second point: the goal of update/enumerate is to improve the count of reservation populations and without a sound operation, the bureau cannot expect to improve the overall enumeration. If the tested operation missed numerous households and did not complete quality control, and if the quality control operation failed to detect enumeration errors, the tested procedures did not produce complete data or an accurate count. In addition, we never suggested that the test failed. As long as the bureau learns from the test and applies what it learned, its purpose has been met.

Census's response also clarified which aspect of the quality control operation it intends to review, and we revised the text accordingly. However, we reassert our concern that problems with the quality control operation go well beyond error definitions. We believe quality control needs to include a component to more effectively identify housing units that were missed by incorporating analysis of housing units with duplicate enumerations, which as we observed, often occur near confusing assignment area boundaries.

Census appeared to agree with the intent of our two recommendations, but disagreed with many of the options we presented to accomplish them. With regard to recommendation 1, the bureau agreed that efforts should continue to adequately provide update/enumerate staff with the tools they need to perform the job. The bureau's concerns about the options we asked it to consider and our comments, where appropriate, are discussed below:

- Adding landmarks: The bureau noted that updating landmarks on maps would significantly increase the cost and complexity of the address canvassing operation. However, given the large number of hand-drawn maps we observed on the paper TIGER maps, many with landmarks and other annotated detail, it appears that many enumerators considered such information to be fairly essential. Geography Division officials told us they sometimes add enumerator-drawn landmarks to TIGER. So we suggest that rather than attempting to update all landmarks on all update/enumerate maps, the bureau consider instructing listers and enumerators to include landmarks only where some or all street signs are missing and the location of a church or school, for example, could be

essential for navigating the area. This would minimize the cost and complexity of making these enhancements.

- Adding community names: Census staff is reviewing the possibility of using a database of locality names maintained by U.S. Geological Survey.
- Clarifying assignment boundaries and location information: The bureau said it would continue its ongoing efforts to improve and refine geographic delineation and is studying a number of options for improving map design. We would appreciate receiving a description of this work and a timeline for completing it in the required action plan Census submits in response to our report.
- Conducting address canvassing quality control without handheld computers: The bureau disagreed with this option, stating that it would not allow for checking and correcting map spot accuracy. Since this is less preferable than providing enumerators with a GPS capability, we eliminated this option from our final report. The bureau did agree to examine the costs, potential benefits, and risks associated with providing handheld computers or off-the-shelf GPS devices to enumerators. We would like a copy of the bureau's findings as part of the action plan or, if not yet finished, the timeline for completing the analysis.

The bureau disagreed with how the second recommendation—to modify update/enumerate quality control procedures to better identify missed or duplicated housing units—could be accomplished. It did not agree with our suggestion to conduct quality control checks across assignment areas, stating that such crosschecking is not feasible within the context of the current quality control design. But many errors occur along assignment area boundaries because of confusion over which assignment area claims borderline housing units. We therefore ask the bureau to discuss in its action plan, methods it believes are feasible for checking assignment area borders to minimize these problems.

## II. Changes Designed to Improve Coverage Yielded Negligible Increase in the Count

Census's choice of the Cheyenne River Reservation as one of the two 2006 census test sites was a good one because the site posed many of the challenges that have long hindered efforts to get an accurate count: a severe housing shortage; large, rural geography punctuated by small communities; unnamed streets and unnumbered houses, to name a few. Tribal officials told Census that multifamily households were likely undercounted in the 2000 decennial. And in 2002, a tribal representative told the Senate Subcommittee on Housing and Transportation that the reservation needed to more than double habitable housing units to accommodate residents. Yet the negligible difference between the occupied housing count in Census 2000 (2,604) and the preliminary number from the 2006 test (2,632) suggests that a housing shortage continues to exist and that numerous multifamily households were likely unaccounted for in the update/enumerate test.

Our analysis of Census's 2006 data revealed that the new query for finding "other individuals or families" identified only 16 households for coverage follow-up, which, in turn, enumerated *only one person* not already included in the more than 8,000 counted by update/enumerate.

### A. Limited Test Scope Produced Disappointing Results

In the Census 2000 update/enumerate operation, enumerators asked a coverage question (figure 7) at the end of the interview to identify any household residents not yet counted. If the respondent answered "yes," enumerators entered the additional persons' data immediately. The coverage question in 2000 yielded less than .03 percent of the total count, leaving the bureau to conclude it needed to conduct more research on how to structure the question and when to enumerate additional people.

**Figure 7. Coverage Question Asked By Enumerators**

**Census 2000 Questionnaire**

**C1. I need to make sure I have counted everyone who lived or stayed here on April 1, 2000. Did I miss -**

- any children, including foster children?
- anyone away on business or vacation?
- any roomers or housemates?
- anyone else who had no other home?

☐ Yes - Add persons(s) to question 1, mark the "Add" box and ask questions 2-5. Correct the POP count in question 55 on the front cover.

☐ No - Continue with C2.


**2006 Census Test Questionnaire**

**C1. We do not want to miss any people who might have been staying here on April 1, 2006. Were there any additional people staying here that you did not include, for example:**

Children, such as newborn babies or foster children? ..... ☐ Yes ☐ No

Relatives, such as adult children, cousins, or in-laws? ..... ☐ Yes ☐ No

Nonrelatives, such as roommates or live-in baby sitters? ... ☐ Yes ☐ No

 Other individuals or families staying here? ..... ☐ Yes ☐ No

People staying here temporarily? ..... ☐ Yes ☐ No

*Source: OIG facsimile of Census forms*

Although previous census tests made some changes to the question, the principal change in the 2006 test was the addition of a new query to four others already established. A second change was the decision to enumerate individuals identified by the question in the later coverage follow-up, rather than on the spot. The bureau believed the on-the-spot approach did not work well, though the documentation it provided did not support this contention. It planned to have specially trained enumerators conduct coverage follow-up, which it expected would improve outcomes.

**Enumerators we observed did not ask the complete coverage question in the 2006 test.**

In 15 interviews conducted by eight different enumerators for which we specifically noted how the query was handled, enumerators asked all five queries only twice. Instead, they generally recited only the introductory statement (“We do not want to miss any people who might have been staying here on April 1, 2006. Were there any additional people staying here that you did not include . . .”) and the first or second query before simply checking “no” for all options. Even though, according to bureau evaluations, this parallels what happened in Census 2000, decennial managers acknowledged that they did not consistently observe how enumerators were asking the coverage question. Further, they did not monitor answers on returned questionnaires as the operation was in progress, so they did not realize that enumerators were not asking the entire coverage question and that few additional people were being identified.

Quality control already consists of a training component where supervisors observe the enumerators’ first few interviews to determine what additional on-the-job training is needed to correct any deficiencies. This process could be enhanced to emphasize the importance of asking the coverage question in its entirety. In addition, the coverage question could be included in the quality control operation as part of the reinterview process. If discrepancies between enumerator and quality control results are found, the enumerator can be retrained as necessary. We advocate at least strengthening the existing quality control components to improve administration of the coverage question.

**Census lacks a clear rationale for reenumerating entire households at a later time.**

Households whose response to the coverage question identified them as having more people to enumerate were reenumerated on a separate occasion, well after Census Day. However, the bureau did not provide a clear rationale for this approach. Residents questioned many weeks, or even months, later about who lived in their household on April 1 may have inaccurate recollections. In fact, the bureau director testified in 2000 that the farther away from Census Day, the more the quality of respondents’ answers deteriorates. Some update/enumerate staff told us they were frustrated by being instructed not to enumerate additional persons identified by the coverage question and were concerned that the later follow-up would fail to find additional household members. Our examination of the results of coverage follow-up suggested their concern had merit: though 16 housing units answered “yes” to the test query, only 1 person was added during the follow-up operation. And only 15 more people were added from the 86 total housing units answering “yes” to the other four coverage question queries—an extremely incongruous result.

***B. Absence of Benchmarks Undermined Census's Ability to Assess 2006 Test Results and Improve 2010 Coverage***

Beyond its failure to detect poor testing of the coverage question, Census had no benchmarks or objectives against which to assess its success at identifying housing units with missed residents. Benchmarks are critical for monitoring progress and indicating potential problems.

The bureau could have established an expected number of overcrowded housing units—that is, households likely to require questionnaire continuation forms because they contain more than five residents (the questionnaire has room for information about a maximum of five people). Our review of the completed questionnaires found that less than 12 percent of the occupied housing units used continuation forms. This low number contradicts what we heard from the tribal housing official—an individual with professional and cultural knowledge about the level of overcrowding—who expected 20 to 25 percent of the reservation's households to have more than five members. On the other hand, it is consistent with the weak results produced by the coverage question and coverage follow-up approach, which clearly indicate that the methods tested were far from sufficient to obtain an accurate count.

The bureau could also have explored the feasibility of identifying areas known to be overcrowded—specific communities, apartment buildings, public housing, for example—and monitored the extent to which large households were being identified via the coverage question response or the use of continuation forms. Among other possible benefits, this comparison would help bureau officials determine whether enumerators were following procedures. If outcomes did not meet expectations, additional training, enumerator observation, or other options to correct deficiencies could have been implemented. Poor implementation of the new approach and the bureau's failure to recognize the problems eliminated opportunities to correct the flaws in the update/enumerate process and determine how best to improve multifamily household coverage on American Indian reservations in 2010.

**Recommendations**

The Director of the Census Bureau should ensure that 2010 decennial managers do the following in connection with update/enumerate operations on American Indian reservations:

1. Reconsider the decision to defer enumeration of additional individuals and families to coverage follow-up.
2. Enhance enumerator training, supervision, and quality control to ensure that the coverage question is asked as intended.
3. Following Census 2010, ensure that all future site tests contain appropriate benchmarks, document how test results will be measured against them, and determine what contingencies will be used to offset problems that emerge as new procedures are implemented.

### Census Response and OIG Comments

The bureau contended that our report incorrectly stated it was unaware that enumerators were not reading the coverage questions *as worded*, claiming that Census Bureau observers had also made comments about this. What the report actually stated is that in nearly all the interviews we observed, enumerators *did not ask the test question at all*. When we informed bureau officials of this on May 24, 2006, they exhibited surprise that the test query was not being asked and that it was eliciting few “yes” responses.

Census defended its decision to defer coverage follow-up, stating that past experiences and testing indicated that the best way to resolve potential within-household coverage errors was to conduct a separate follow-up interview using specially trained staff. But we have never seen documentation supporting this decision. We asked for but never received any evaluation materials regarding the change. Census eventually sent a brief e-mail in response to our requests, in which it stated the 2006 change was based on the results of an evaluation that measured impact of the Census 2000 coverage question. But that evaluation neither discusses nor recommends deferring follow-up to a later operation. Rather, it recommends adding the names of newly identified people immediately after the question, then enumerating them on the spot, which reaffirms how it was done in 2000. Neither the e-mail nor the evaluation addresses the possible risks associated with delaying the subsequent data collection.

With regard to our recommendations, Census stated that it has yet to complete its own evaluation of the coverage follow-up operation but will use its analysis to reconsider deferring additional enumerations until that later operation. We ask that the bureau’s action plan (1) provide us with the results of this evaluation once completed or with a timeline for completing it, and (2) address the risks associated with the deferral and the ramifications of the negligible increase in the count that resulted from the coverage question.

The bureau stated that it generally agreed with the recommendation to enhance enumerator training and supervision to improve use of the coverage question. However, it disagreed with our proposed solution of using quality control to check how the enumerators administer it; in particular, it stated that there is no practical way to use the quality control operation to ensure the coverage question is asked as worded. We have added a paragraph to the report to show how we believe existing components of the quality control design could possibly effect such improvement. We ask that Census consider these approaches or offer alternative solutions in its action plan.

Finally, Census declined to agree with our recommendation regarding the development of benchmarks, but stated it was willing to consider any specific benchmarks we might suggest for specific operations. We believe the bureau needs to develop these measures as it is determining its test objectives and choosing corresponding sites, because these decisions should involve the establishment of criteria for measuring the impact of tested improvements. Appropriate benchmarks are an extension of such criteria and a check on their validity. So again, we ask Census to address in its action plan, steps for incorporating benchmarks into its testing approach and agenda for the 2020 decennial that are relevant to specific test objectives and sites.

### III. Leadership Devoted to Transforming Census's Approach Is Needed to Improve the Count on American Indian Reservations

While acknowledging that enumerating American Indians and Alaska Natives has historically been “less than successful,” and setting improved enumeration methods for these populations as a goal for the 2006 test, the bureau did not substantially alter its Census 2000 process for enumerating reservations. The only operational improvement tested *specific to the reservation* was the new coverage query (“other individuals or families staying here”)—a remarkably modest modification given the importance of the challenge. Census’s response to our question regarding what other changes were proposed but not implemented was that “all changes or adaptations [proposed] were implemented.” Moreover, there was no Census headquarters official whose principal responsibility was to plan and implement the 2006 update/enumerate test for American Indian reservations. Although many employees work on American Indian issues, no one is charged with the singular task of improving enumeration on reservations for 2010. We are therefore left to question the priority and attention the bureau is giving to developing methods for reducing the undercount on American Indian reservations.

In our view, adjustments to the coverage question and follow-up approach by themselves will not adequately improve the count of multifamily households. Likewise, modifications to the questionnaire will not solve the map and address problems that underlie a sizable number of missing enumerations and surely contribute to the undercount on American Indian reservations. The bureau missed the opportunity in the 2006 test to evaluate other concepts and see which options offer the greatest potential for increasing the count. Major transformation is needed to produce better data, faster, and at a lower cost, not only for multifamily households but for the reservation as a whole.

Given the test’s scant ambitions, the bureau forfeited the opportunity to obtain valuable information in a number of areas by not testing the following:

- Alternative coverage procedures, such as asking how many families live in the housing unit at the beginning of the interview rather than at the end.
- The viability of using local administrative records against which to compare enumeration results.
- Use of handheld computers for navigation only in update/enumerate.
- Examination of results during the operation to identify duplicates and alert quality control about possible missing enumerations.
- Usability of the TIGER maps and effectiveness of map changes made since Census 2000.
- Other operational changes, such as pairing up enumerators in some of the more difficult assignment areas.



While some of these approaches may initially be more costly, the end result could be more accurate, reliable data; increased acceptance rates of enumerations by quality control; and less overall time to complete the operation. For example, mileage costs alone totaled about \$79,000 (\$26 per address), according to the bureau. Enumerators, while driving long distances, have to work out routes, follow assignment area boundaries, and match address descriptions to housing units. It became evident during our fieldwork that designating one person to drive and another to read maps and address lists is a far more reliable, faster, and safer method of traversing assignment areas and locating housing units. We found missed housing units that may have been overlooked because they were set back some distance from the road and thus unnoticed by an enumerator driving and working alone.

The bureau also needs to better monitor the progress of its tests to determine whether the operations are being implemented to meet the objectives and to better inform its evaluations and conclusions. If the new coverage query is rarely asked, for example, and the bureau is not aware of this, the validity of its postoperation assessment will be questionable at best. More focused headquarters observations of the operation and use of benchmarks to monitor test progress would be of value as testing proceeds. And as our findings amply demonstrate, numerous aspects of the basic update/enumerate operation require substantial enhancement, suggesting that seemingly routine processes and activities of any census test bear close scrutiny and evaluation for purposes of continual improvement.

Finally, the bureau must designate someone who can help remedy the situation for 2010 by making effective changes to the problematic methods and procedures discussed in this report, as well as implementing other improvements as deemed necessary.

### **Recommendations**

The Director of the Census Bureau should assign a senior headquarters official specific responsibility for the following:

1. Leading the effort to reexamine the bureau's complete approach to enumerating multifamily households on American Indian reservations, and ensuring that relevant procedures, training, supervision, and quality controls are revised accordingly.
2. Implementing and monitoring the changes necessary to make the 2010 enumeration of American Indians on reservations a process that significantly decreases the undercount.

### **Census Response and OIG Comments**

Census took exception to this finding and the corresponding recommendations, insisting that we did not accurately characterize the level of effort made to improve coverage on American Indian reservations or the virtual elimination of the undercount in the 2000 decennial. The bureau lists a number of partnership and liaison activities as further proof of the efforts it made. But our report focuses on the *2006 test of reservation enumeration*: we found that no single individual was responsible for leading this aspect of the test, and this void was apparent in the numerous meetings we had with headquarters officials during the course of our review. And while partnership and liaison activities may increase the number of responses to the Census

questionnaire, improved tribal relations will not fix flawed enumeration field practices and procedures.

In its response, the bureau states that our report inaccurately implies that no progress has been made for decades and argues that Census 2000 showed significant progress over the 1990 census in counting American Indians residing on reservations: its 1990 estimated coverage error showed a net undercount of 12.22 percent (with a standard error of 5.29 percent), while Census 2000 showed a net overcount of 0.88 percent (with a standard error of 1.53 percent). The bureau attributes the improvement to its numerous interactions with tribal representatives, the efforts of its American Indian and Alaska Native Advisory Committee, and paid advertising.

Nevertheless, the fact remains that this population has been undercounted in numerous if not all prior censuses and the problem is therefore a historical one. Further, we take exception to the bureau's assertion that the undercount<sup>12</sup> was eliminated in the 2000 census for the following reasons:

The bureau had to discard its initial estimate of the Census 2000 coverage error because, while the decennial count exceeded the population estimate by nearly 7 million, the initial error estimate found that the census had an undercount. For its second error estimate, the bureau factored in an unprecedented 6 to 7 million duplicate enumerations that had occurred in the census. This estimate newly yielded an overcount for the nation as a whole. Moreover, the overcount was found not only for the previously-undercounted American Indian reservation population, but also for several other historically hard-to-count groups, such as Hispanics and Asians. The estimation methods and reliability of their results have been questioned by the National Academy of Sciences, GAO, and the Decennial Census Advisory Committee. The purported overcount for American Indians is further suspect in light of testimony from Navajo and Hopi tribal leaders, who in 2004 told the House Financial Services Subcommittee on Housing and Community Opportunity that Census 2000 undercounted their reservations. Cheyenne River Sioux tribal leaders expressed the same belief to us about their reservation. Certainly, the missed housing units and enumerations we observed during the test confirm that an undercount in 2010 is a very real possibility and should therefore be a very real concern. The National Academy of Sciences has noted that a sizable differential undercount among all hard-to-count groups could result in 2010 if the census design is very effective in deleting duplicates but not effective in reducing omissions.<sup>13</sup>

But even putting the Census 2000 results aside, the bureau's own plans for Census 2010 emphasize the need for identifying and testing creative approaches to successfully enumerating the American Indian population. And the results of the 2006 test—which were several hundred people short of the bureau's own 2006 population estimates for the two counties in the site—indicate that Census's efforts to realize its ultimate goal of successful enumeration may have lost ground as well.

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<sup>12</sup> "Net overcount" is shortened to "overcount"; similarly, "undercount" implies "net undercount".

<sup>13</sup> National Academy of Sciences, *Research and Plans for Coverage Measurement in the 2010 Census: Interim Assessment*, 2007. Page 1-13.

## **SUMMARY OF RECOMMENDATIONS**

**The Director of the Census Bureau should ensure that 2010 decennial managers do the following:**

1. Analyze and document the most cost-effective way to give update/enumerate staff the tools they need to easily traverse assignment areas and identify housing units. The bureau should consider the following options (see pages 15-16):
  - Improving update/enumerate maps by
    - ≈ adding current landmark information and community names,
    - ≈ providing clear assignment area boundary and location information,
    - ≈ placing small settlements in a single assignment area and ensuring small blocks contained in geographically large blocks are both visible and legibly labeled, and
    - ≈ developing a process to increase the scale for concentrated areas of housing units.
  - Ensuring the address canvassing operation provides an appropriate level of information for the later operations by
    - ≈ verifying that every address field has an entry, and
    - ≈ identifying and prioritizing the important distinguishing structural characteristics to be used to describe housing units and emphasizing their importance in the training for reservation canvassers.
  - Using handheld computers or an inexpensive, off-the-shelf device equipped with GPS in conjunction with the housing unit GPS coordinate information obtained during address canvassing.
2. Modify update/enumerate quality control procedures to better identify missed or duplicated housing units, for example, by conducting quality control checks across assignment areas (see page 16).
3. Reconsider the decision to defer enumeration of additional individuals and families to coverage follow-up (see page 20).
4. Enhance enumerator training, supervision, and quality control to ensure that the coverage question is asked as intended (see page 20).
5. Following Census 2010, ensure that all future site tests contain appropriate benchmarks, document how test results will be measured against them, and determine what contingencies will be used to offset problems that emerge as new procedures are implemented (see page 20).

**The Director of the Census Bureau should assign a senior headquarters official specific responsibility for the following:**

1. Leading the effort to reexamine the bureau's complete approach to enumerating multifamily households on American Indian reservations, and ensuring that relevant procedures, training, supervision, and quality controls are revised accordingly (see page 23).
2. Implementing and monitoring the changes necessary to make the 2010 enumeration of American Indians on reservations a process that significantly decreases the undercount (see page 23).

## APPENDIX: 2006 CENSUS TEST OBJECTIVES<sup>14</sup>

<p><b>1. American Indian and Alaska Native</b></p> <p>Develop, test, and evaluate improved enumeration methods on an American Indian Reservation.</p>
<p><b>2. Coverage Improvement</b></p> <p>1. Develop new methods for improving coverage, including procedures to address overall coverage of the population and housing, and procedures to address duplication issues. Specifically, this includes (a) testing improvements to the residence rules and instructions, particularly focusing on improvements to how residence rules are handled in field enumeration, and (b) developing and testing operations to improve coverage, including all aspects of the Coverage Follow-up operation and coverage questions.</p> <p>2. Develop and test an automated system of recycling cases during an operation to ensure quality. This includes confirming deletes during Address Canvassing, instead of creating a separate field operation to confirm their status and verifying vacants and deletes during Nonresponse Follow-up.</p> <p>3. To develop and test chosen imputation methodologies for characteristic imputation.</p>
<p><b>3. Census Coverage Measurement (CCM)</b></p> <p>1. Design and test data collection methods for the Person Interview and Person Follow-up interview to allow us to determine whether census enumerations and omissions were counted correctly at various levels of geography with sufficient accuracy to support estimation of component and net coverage errors.</p> <p>2. Determine if conducting the CCM Person Interview as soon as Census Nonresponse Follow-up (NRFU) is complete (and while Coverage Follow-up Operations are being conducted) in a sample area adversely affects the census data.</p>
<p><b>4. Field Activities</b></p> <p>1. Assess the feasibility and effectiveness of using HHCs for both new functionality and improved functionality from that used during the 2004 Census Test (including Global Positioning System (GPS) technology) during the combination Nonresponse Follow-up NRFU/Vacant/Delete (V/D) operation.</p> <p>2. Determine the operational feasibility, impact, and effectiveness of implementing a fingerprinting security check of applicants for field positions.</p>
<p><b>5. Language</b></p> <p>Develop, test, and evaluate a fully translated Spanish language instrument on the HHC used during the NRFU operation (Questionnaire Fulfillment and Response options).</p>
<p><b>6. Self Response Options</b></p> <p>Implement the optimal mailing strategy timing and assess the impact it has on response and other data collection operations (replacement questionnaire delivery).</p>
<p><b>7. Special Places/Group Quarters (GQs)</b></p> <p>1. Obtain administrative lists for selected types of group quarters; process and update the MAF with these addresses before Address Canvassing (Use of Administrative Lists for Frame Development).</p> <p>2. Continue to implement an integrated approach for updating the list of living quarters during Address Canvassing and the Group Quarters Validation operations (Other Living Quarters Validation).</p> <p>3. Implement revised GQ type definitions and classifications in all of the frame building and enumeration operations (Definitions and Classification).</p>
<p><i>Grayed-out objectives not applicable to the Cheyenne test site</i></p>

<sup>14</sup> Revised 2006 Census Test Project Management Plan, July 10, 2006.

## AGENCY RESPONSE



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

**MAY 28 2007**

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

Through: Cynthia A. Glassman *elt for*  
Under Secretary for Economic Affairs

From: Charles Louis Kincannon *CKincannon*  
Director

Subject: Comments on the Office of Inspector General's draft report  
entitled *2010 Census: Key Challenges to Enumerating American  
Indian Reservations with Historic Undercount Unresolved by 2006  
Census Test (OSE-18027)*

The attached is in response to your request of April 10, 2007, for comments on the above-referenced report. We appreciate the opportunity to review the report prior to publication.

Attachment

cc: US/EA

## AGENCY RESPONSE

Draft Report No. – OSE-18027/April 2007  
*2010 Census: Key Challenges to Enumerating American Indian Reservations with  
Historic Undercount Unresolved by 2006 Census Test*  
U.S. Census Bureau Comments

The Census Bureau appreciates this opportunity to comment on the findings and recommendations from the Office of Inspector General (OIG). Overall we believe the 2006 Census Test was successful—it provided us with an opportunity to study new methods, operations, and uses of technology.

We have two areas of general concern with the conclusions and recommendations in this report, and also have a number of specific comments. We also have provided our responses to the OIG's six recommendations.

### **Census Bureau General Concerns**

1. The Census Bureau is concerned with the fact that this report (including its title) consistently mischaracterizes the objectives of our 2006 Census Test, and consistently overlooks the significant improvements made last decade in reducing the undercount of American Indians living on reservations.
  - The Census Bureau had many objectives for conducting the 2006 Census Test, and almost all of them related to studying new methods, operations, and uses of technology for enumerating sparsely populated areas of the country in general, not just those living on reservations. The OIG's characterization of the purpose of this test is not accurate. The Census Bureau does not know how the OIG decided on its list of key challenges (see page i), but these were not our goals for this test, nor (as stated) were these the criteria we used to select this test site.
  - For the 2006 Census Test, once we had selected this site, we did develop three specific goals with respect to finding ways to improve enumeration of the American Indian population on reservations, and the OIG report describes all three of these goals on page 1 of its report. However, based on the contents of the report, the OIG reviewed only our efforts related to the first of these goals, yet then criticizes the Census Bureau for not making more efforts.
  - Further, while these three goals may have appeared "remarkably modest" to the OIG, they were designed to build on many efforts, and significant progress made last decade. In 1990, the estimated coverage error for American Indians residing on reservations was a net undercount of 12.22 percent (s.e. 5.29 percent). Yet for Census 2000, the final estimated coverage for American Indians on reservations was a small net overcount of 0.88 percent (s.e. 1.53 percent). This improvement resulted from a number of improvements made last decade, including the use of a tribal liaison program, the use of tribal partnership specialists, a number of tribal consultations, paid advertising, and efforts during the decade with our American



Indian and Alaska Native (AIAN) Advisory Committee, tribal governments, and others. We plan to repeat such efforts for the 2010 Census, so are hopeful we can maintain and build on the improvements we made last decade. We agree with the OIG that it is difficult to count these areas, but as written, their report implies that no progress has been made for decades, and that is not accurate.

- Further, the OIG report then goes on to attribute this lack of effort to “a leadership vacuum at the Census Bureau,” and makes a formal recommendation that the Census Bureau Director should appoint a senior official with primary, if not sole, responsibility for ensuring improved enumeration of American Indian reservations in 2010. We do not agree with this conclusion nor this recommendation. The OIG has not accurately characterized the level of effort the Census Bureau has made since 1990 to improve coverage on American Indian reservations, nor the success we experienced in 2000. Senior Census Bureau officials helped develop and lead those efforts last decade and are committed to repeating and building on those successful efforts for 2010. In addition, we consult with our AIAN Advisory Committee on all proposed methods and plans for conducting the 2010 Census on American Indian reservations.
- The OIG report also implies that the Census Bureau was testing ways to improve our Update/Enumerate (U/E) methodology, but we had no such objectives for the 2006 Census Test. We used the U/E methodology in 2006 because that is the methodology we plan to use for reservations (and other sparsely populated areas) in 2010. We used this method for such areas in Census 2000 as well, and we believe it was an improvement compared to the List/Enumerate (L/E) methodology used for previous censuses. With the L/E methodology, address list development and enumeration occur at the same time, with only one pass over the area. With the U/E methodology, we have two opportunities to ensure good coverage—first during Address Canvassing and second during the enumeration phase.
- The Census Bureau agrees with the OIG report that we encountered some problems during the U/E operation in the 2006 Census Test, but most of these resulted from earlier problems with the Address Canvassing operation. Based on the results and our evaluations of the Address Canvassing operation (our first ever attempt to conduct this operation using automated devices), we are working now to correct those problems before we conduct the nationwide Address Canvassing operation in 2009. However, because we did not have any specific test objectives regarding the U/E methodology, the fact that we were unable to complete the U/E operation for all assignment areas does not mean this was a failed test. The Census Bureau will only consider this a failed test if we do not learn from our experiences there. We do appreciate the OIG’s observations and comments about Address Canvassing and U/E problems in the test, and will take them into consideration as we finalize our Address Canvassing and U/E methods for 2010.

2. The Census Bureau also is concerned that the report presents a number of conclusions based on what appears to be a non-representative sample of only 12 (out of 215) assignment areas in this test area.

- The report states that OIG staff observed a total of 17 interviews, which would represent less than half of 1 percent of the approximately 3,000 households in the test area. There is nothing to indicate how the OIG selected these cases, or how they selected the interviews they observed. If the cases were selected in a non-random fashion, as seems to be the case, it would not be appropriate to generalize from this small sample to the entire test the cases were selected at random or in any other statistically representative fashion.
- Of even greater concern from a methodological perspective, the OIG states that much of their detailed work, and most of their stated findings and recommendations, stem from their analysis of only 12 assignment areas they selected for close scrutiny. The OIG states that they selected these particular 12 assignment areas because they were areas that “exhibited the types of problems we were observing in the field.” If this statement fully describes their sampling methodology, then the OIG’s findings are at best not generalizable and, at worst, biased.

That is, if the OIG selected a small number of areas to study based on whether those areas appeared to have problems, it should come as little surprise that they observed some problems in those areas. What is surprising is that the OIG then generalizes what they found in these non-representative areas to the entire test site, and then draws conclusions about how well the Census Bureau will be able to conduct these operations for the 2010 Census on American Indian reservations in general. Further, the general reader of this report is not advised of the possible limitations to the OIG’s findings, given the methodology they used to arrive at their conclusions.

- In addition, both the cover letter and executive summary of the OIG report make very strong, negative, and sweeping statements about the quality of Census Bureau maps and address canvassing. Statements like “virtually illegible, inaccurate maps, and incorrect addresses” would, on face value, indicate that none of the maps were any good, and that all of the addresses were incorrect. Again, none of these statements are accompanied by any caveats stating that the conclusions are based on a sample of observations, much less that they are based on what appears to be a biased sample. Further, in the detailed sections of the report, the specific problems the OIG describe do not sound nearly as pervasive or debilitating. For example, on pages 8-9 the report includes the following statement: “...we observed that enumerators had difficulty finding their assignment areas, reading the map spots (which represent individual housing units), and associating address descriptions with the correct housing unit because address canvassing did not adequately improve maps and housing unit descriptions. Moreover, maps of some assignment areas were virtually

illegible....” The phrases “had difficulty” and “maps of some assignment areas” hardly seem sufficient to warrant the much stronger, broader, and more critical statements found in the cover letter.

- In several places the report makes statements or recommendations based on the OIG’s assessment of our coverage improvement objectives for this test. We have not completed our own evaluation of those objectives, so we cannot fully respond to the OIG at this time. Once we have completed our evaluations, we will take the OIG’s recommendations into account as we make final decisions on these matters for the 2010 Census.
- Finally, we note that the Census Bureau does not have access to the satellite imagery, independent listings, other materials, or methodology used by OIG staff to draw their conclusions about coverage errors made by Census Bureau staff during this test. Therefore, we cannot verify the accuracy of the OIG’s findings. For example, although the OIG identified several housing units (HUs) as having been missed by our Address Canvassing operation last fall, we have not reviewed their documents to determine whether those units existed (or were physically at those locations) at the time of an operation that took place many months prior to the OIG’s work.

#### **Specific Census Bureau Comments**

The Census Bureau also have some additional specific comments:

#### **Page ii**

The report criticizes the Census Bureau for increased costs to conduct the U/E operation by citing a cost of \$82 per HU in this test, versus \$30 per HU in Census 2000. This comparison is not valid for several reasons. First, these figures are not in comparable dollars, so they do not take inflation into account. Second, in order to conduct this test of a relatively small area, we nonetheless had to set up a census field office just for this test area. During the actual census, the Local Census Office (LCO) for this area will be responsible for a much larger area and many more HUs, so the fixed costs of the LCO will contribute less to the average cost per HU.

Regarding the OIG’s various criticisms of the quality of maps for this test, most seem to deal more with printing and scale problems. These comments will be helpful in our efforts to try to improve that situation, but overall we believe that the quality of maps have been much improved by our Topologically Integrated Geographic Encoding and Referencing (TIGER) realignment and the use of Global Positioning System (GPS), and that the realigned maps used for the 2010 Census Address Canvassing will contribute to vastly improved map quality, compared to that of Census 2000. In particular, map spot placement, whether through GPS or manual collection, is undoubtedly much improved with respect to spatial accuracy.

Pages ii and iii

Regarding the origins of the specific change we made to the coverage probe on the questionnaire for the 2006 Census Test, several years ago staff from headquarters, the Denver Regional Office (which has responsibility for census and survey efforts for over 75 percent of the reservations in the country), and various American Indian advocacy groups attended a meeting to discuss the coverage of American Indians. Based on discussions about the extent of “doubled-up” households (multiple families sharing the same housing unit), for the 2006 Census Test we developed an additional category for our existing undercount detection coverage probe to try and identify households containing additional individuals or families staying at the address. We have not yet completed our evaluation of this test objective, so we cannot say whether it was successful or whether we will use it for the 2010 Census. As mentioned above, we also consulted with our AIAN Advisory Committee on these matters.

The OIG also criticizes our decision not to use the results from all the coverage probe questions (during the U/E interview) to immediately add or delete people from the questionnaire. However, based on past experiences and testing, we believed we would obtain more accurate results through the approach we tested. With that approach, the U/E interview was designed to identify situations where there might be coverage errors, but the resolution of such situations was handled by a separate staff trained more extensively in the application of our residence rules. Again, we have not yet completed our evaluation of this test objective, so we cannot say whether it was successful or whether we will use it for the 2010 Census.

This report also states the Census Bureau was unaware that enumerators were not reading the questions as worded. This is not correct. Census Bureau observers also made comments about enumerators not reading the undercount coverage question as worded. If the results of our evaluation indicate we should use these coverage questions for the 2010 Census, we will consider revisions to the U/E enumerator training to reinforce the need to ask these questions as worded.

Page 3

The report includes the following paragraph: *“For each enumerator, quality control staff conducted three follow-up interviews to verify that an enumeration occurred.... This recanvassing was subject to another quality check. If the area failed again, it was recanvassed one final time.”* This paragraph incorrectly describes the components of the quality control (QC) program.

- First, we conducted a reinterview operation to check a sample of interviews conducted by each enumerator. This involved a follow-up interview with each sampled household to verify whether the interviewer had been there, and to independently collect household and roster information. The results later were compared to the data collected in the original interview to determine the final outcome of the reinterview case.

- Second, we conducted a dependent quality check of the address updating performed in each assignment area. This involved a verification of the work for a string of eight consecutive housing units. The starting point for the string of eight housing units was randomly selected within each assignment area.
- Third, we conducted an independent verification operation for 100 percent of the deletes and duplicates identified by each interviewer in all assignment areas.

#### Page 13

The report includes the following statement: *“Bureau officials acknowledge problems with the quality check and intend to review the failure criteria to see if they were too stringent.”*

This statement is not accurate. The Census Bureau intends to review the error definitions (which may have been too broad) for U/E, not the failure criteria. For both the Address Canvassing and U/E operations, the QC failure criteria were designed to ensure an average outgoing error rate of less than 3 percent.

#### Page 17

*“Some update/enumerate staff told us they....were concerned that the later follow-up would fail to find additional household members. Our examination of the results of coverage follow-up substantiated their concern: though 16 housing units answered “yes” to the test query, only 1 person was added...”*

The Census Bureau does not believe this conclusion can be justified based on the fact that only one person was added. Further analysis is needed to understand what occurred in the other 15 housing units. This must include determining if the coverage follow-up operation identified persons who were potential adds and, if so, why these persons were or were not added to the household roster. The OIG implies that more people would have been added if interviewers had been allowed to add people at the time of the U/E operation, but the report presents no data to substantiate this, nor is there any evidence that persons added would have been correctly added and not added in error.

#### Page 19

*“...the bureau forfeited the opportunity to obtain valuable information...by not testing.... The viability of using local administrative records against which to compare enumeration results.”*

Although we did not use local administrative lists, the Census Bureau did in fact test the use of administrative records for this purpose in the 2006 Census Test. We matched these administrative records to the results of the U/E interview, and for situations that indicated a potential coverage problem, we conducted coverage follow-up interviews in

an attempt to identify missed persons. Analysis of these data is still underway, so we are not yet in a position to comment on the viability of this approach for the 2010 Census.

*“...the bureau forfeited the opportunity to obtain valuable information...by not testing... Examination of results during the operation to identify duplicates and alert quality control about possible missing enumerations.”*

As described earlier, the Census Bureau believed that the best way to resolve potential within-household coverage errors (both misses and duplications) was to conduct a separate follow-up interview using specially trained Census Bureau staff. We did not believe that the U/E interview, nor the QC operation for U/E, was the most effective way to resolve these (often complex) situations. However, we have not yet completed our evaluation of this test objective (conducting a separate follow-up to resolve these cases). Once we do, we will consider this OIG recommendation in making our final decisions for the 2010 Census.

#### **Census Bureau Responses to Recommendations**

The Census Bureau also has the following responses to the OIG recommendations that begin on page 21.

***The Director of the Census Bureau should ensure that 2010 decennial managers do the following:***

- 1. Analyze and document the most cost-effective way to give update/enumerate staff the tools they need to easily traverse assignment areas and identify housing units. The bureau should consider the following options (see pages 14-15).*

The Census Bureau agrees that such efforts should continue, but we do not agree with all of the specific suggestions offered by the OIG.

For example, we note that adding “current landmarks” would significantly increase the cost and complexity of the Address Canvassing operation, including such things as software development, manuals, training, and field costs. These cost increases must be weighed against the potential benefits of adding and maintaining this information in our files.

With respect to the suggestion to add “community names,” staff from our Geography Division are investigating the Geographic Names Information System (GNIS) offered by the United States Geological Survey (USGS). Our initial review indicates that locale names are indicated by a point on the USGS quadrangles and that in some remote areas, no locale names exist on the GNIS. However, we plan to study the relationship between how these data are structured in the GNIS and how we would import and use these data in our Master Address File/TIGER system. We also will plan to study a small sample of the GNIS names for accuracy.



With respect to the recommendations to provide clear assignment area boundaries and location information, the Census Bureau will continue its ongoing efforts to improve and refine geographic area delineation. We also will continue our efforts to study a number of options for improved map design, such as sheeting, scaling, symbolization of spatial data, labeling and placement of labels, and related map content.

The OIG also recommends “verifying that every address field has an entry” and “identifying and prioritizing the important distinguishing structural characteristics to be used to describe housing units and emphasize their importance in the training for reservation canvassers.” Of course these recommendations apply to all areas where we need to rely on a physical description for a housing unit, not just reservations. We stress the importance of using permanent features (like characteristics of the physical structure) during our training, but we will review our current training for more appropriate wording and examples.

We do not agree with the OIG recommendation that we should conduct the Address Canvassing QC without using GPS coordinates. One of the tasks of the QC operation is to check and correct the map spots obtained by the listers. If the QC staff do not have GPS information, they will not be able to correct map-spotting errors.

The OIG also recommends “*Using handheld computers or an inexpensive, off-the-shelf device equipped with GPS in conjunction with the housing unit GPS coordinate information obtained during address canvassing.*” The Census Bureau agrees we should examine the costs, potential benefits, and risks associated with making this change for the 2010 Census.

2. *Modify update/enumerate quality control procedures to better identify missed or duplicated housing units, for example, by conducting quality control checks across assignment areas (see page 15).*

The Census Bureau disagrees with the last part of this recommendation. The existing QC procedures already allow for the QC listers to identify and correct missed and duplicated units, and the purpose of the QC operation is to verify that the listers are following proper procedures and updating the address lists and maps for a particular assignment area. We do not believe that expanding the scope of QC to include a “search” for missed or duplicated housing units across assignment areas is feasible, particularly if the expanded area crossed into other areas for which different listers and QC staff are working. It would also require each QC lister to have address lists and maps for many assignment areas, which would be a significant added burden to both the LCO’s and the QC staff.



3. *Reconsider the decision to defer enumeration of additional individuals and families to coverage follow-up (see page 18).*

As described earlier, and based on past experiences, the Census Bureau believed that the best way to resolve potential within-household coverage errors (both misses and duplications) was to conduct a separate follow-up using specially trained Census Bureau staff. We did not believe that the U/E interview, nor the QC operation for U/E, was the most effective way to resolve these (often complex) situations. However, we have not yet completed our evaluation of this test objective. Once we do, we will consider this OIG recommendation in making our final decisions for the 2010 Census.

4. *Enhance enumerator training, supervision, and quality control to ensure that the coverage question is asked as intended (see page 18).*

The Census Bureau generally agrees with this recommendation, but has some disagreement with the OIG's proposed solutions. Our Field Division will continue its efforts to ensure that training and supervisor reviews stress the importance of asking questions as worded, but we do not believe there is any practical way to use the QC operation to accomplish such a goal.

5. *Following Census 2010, ensure that all future site tests contain appropriate benchmarks, document how test results will be measured against them, and determine what contingencies will be used to offset problems that emerge as new procedures are implemented (see page 18).*

Based on the OIG's discussion of what this might entail (see page 18), the Census Bureau does not believe it is generally possible to agree to this recommendation in the abstract. The discussion on page 18 suggests that the Census Bureau needs to develop specific estimates of how often certain problems or events might occur during field operations (e.g., the number of households that will have more than five household members), monitor production work for the actual levels of these problems/events, and be ready to take action if the actual levels differ from expectation. We are willing to consider specific suggestions of this type for specific operations, but it is impossible to respond in general.

***The Director of the Census Bureau should assign a senior headquarters official specific responsibility for the following:***

1. *Leading the effort to reexamine the bureau's complete approach to enumerating multifamily households on American Indian reservations, and ensuring that relevant procedures, training, supervision, and quality controls are revised accordingly (see page 20).*

2. *Implementing and monitoring the changes necessary to make the 2010 enumeration of American Indians on reservations a process that significantly decreases the undercount (see page 20).*

As stated earlier, we do not believe this conclusion nor this recommendation are justified. The OIG has not accurately characterized the level of effort the Census Bureau has made since 1990 to improve coverage on American Indian reservations, nor the success we experienced in 2000. Senior Census Bureau officials and key stakeholders (including our AIAN Advisory Committee) helped develop and lead those efforts last decade, and are committed to repeating and building on those successful efforts for 2010.

For example, at the beginning of this decade we formed a Research and Development Planning Team for American Indian and Alaska Native Village enumeration. Senior management from multiple divisions participated on that team, including the Director of our Denver Regional Office, which has responsibility for enumerating over 75 percent of the reservations in the country. The primary goal of the group has been to develop and manage research and development of enumeration and outreach strategies for American Indian Reservations and Alaska Native Villages. Specific program objectives (several of which were addressed through objectives for the 2006 Census Test) included:

- Researching and identifying efforts to enhance the government-to-government relationship with tribal governments to ensure accurate enumeration of residents living in American Indian areas.
- Enhancing geographic programs to encourage participation by tribal governments.
- Improving outreach and partnership activities to increase participation of AIAN's living in American Indian areas.
- Researching and developing new strategies for enumerating American Indian areas.
- Reviewing and developing new recruiting strategies for selection and hiring of American Indians living on reservations.
- Developing methods to ensure better communication with federally recognized tribal governments, including adoption of the AIAN Policy initiative, and by better defining the scope of formal consultations with tribal governments.

This last bullet points to one of the most important efforts—the tribal consultation meetings that will begin next month and continue through September of this year. The Census Bureau is sponsoring 14 tribal consultation meetings with tribal governments throughout Indian Country and Native Alaska. Some of the key outcomes we seek from these government-to-government meetings include:

- Improve communications with tribal officials.

- Create an opportunity for AIAN governments to raise issues and Census Bureau to gain insight into key issues.
- Build partnerships and collaboration on issues of mutual concern.
- Identify issues requiring input and participation.
- Promote innovative methods for further consultation.
- Involve tribes in the decision-making process.
- Allow for a two-way process.
- Build a permanent relationship between tribal governments and the Census Bureau.

Activities have taken place on all these fronts this decade, and many senior Census Bureau officials have been and will continue to be engaged in efforts that require expertise on many fronts.





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