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

February 7, 2012

2010 CENSUS PLANNING MEMORANDA SERIES

No. 171

MEMORANDUM FOR The Distribution List

From: Arnold Jackson *[signed]*
Acting Chief, Decennial Management Division

Subject: 2010 Census Update/Leave Quality Profile

Attached is the 2010 Census Update/Leave Quality Profile. The Quality Process for the 2010 Census Test Evaluations, Experiments, and Assessments was applied to the methodology development and review process. The report is sound and appropriate for completeness and accuracy.

If you have questions about this report, please contact Heather Parks at (301) 763-6007.

Attachment

December 12, 2011

2010 Census: Update/Leave Quality Profile

U.S. Census Bureau standards and quality process procedures were applied throughout the creation of this report.

Heather Parks
Decennial Statistical Studies Division

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Executive Summary

This report contains the results of the 2010 Census Update/Leave Quality Control program. The Update/Leave Operation and the associated Quality Control program occurred in 304 of the 494 Local Census Offices across the United States and Puerto Rico from March 1, 2010 to April 2, 2010. Although termed Update/Leave, the operation was conducted in Type of Enumeration Areas 2 (Update/Leave areas) and 7 (Urban Update/Leave areas), which included areas severely impacted by natural disasters. The Update/Leave universe predominantly consisted of areas where it was difficult to match the mailing address of the housing unit with the location address, such as Post Office Boxes, rural route addresses, and mass mailings to apartment complexes with a single drop point rather than those where mail is delivered to individual apartment mailboxes. The purpose of the Update/Leave Operation was to verify and/or update address information and maps and leave a 2010 Census questionnaire for respondents to mail back to the Census Bureau at every housing unit originally included in the universe and added during the Update/Leave Operation.

The purpose of the Update/Leave Quality Control program was to make sure the Enumerators understood canvassing procedures and to make sure the address list and associated maps were legible and contained all necessary information. The Quality Control program consisted of four components:

- Assignment Area Binder Assembly Check
- Initial Observation of Enumerators
- Dependent Quality Control check of each Assignment Area
- Crew Leader Review and Office Review

Assignment Area Binder Assembly Check

Local Census Office clerks conducted the Assignment Area Binder Assembly Check on a sample of Assignment Area binders to ensure all of the necessary materials were included. These checks were a means to limit the amount of confusion with the materials once in the field. This was an informal quality check and no data were collected as a result.

Initial Observation Description and Results

Crew Leaders observed all of the Enumerators as soon as possible after training to make sure they understood the Update/Leave procedures. Production Crew Leaders observed the Production Enumerators canvass for two hours or canvass at least ten addresses. Quality Control Crew Leaders observed the Quality Control Enumerators complete at least one Dependent Quality Control sample. The Initial Observation was designed as an extension of training, and therefore, the Crew Leaders provided feedback to correct misunderstandings of procedures and improve the performance of the Enumerators. If the Enumerator had an unsuccessful first Initial Observation, but the Crew Leader believed the Enumerator could understand the procedures after more training, the Enumerator received additional training and the Crew Leader conducted a second Initial Observation. The Crew Leader recorded the results of the observations on the D-1222 (UL), Observation Checklist. Detailed below are the results of the Initial Observations:

- The Paper-Based Operations Control System reported 42,321 Production Enumerators and 9,643 Quality Control Enumerators worked at least one Assignment Area during the Update/Leave Operation. We received a total of 19,376 (45.78 percent) Production Enumerator Observation Checklists and 4,441(46.05 percent) Quality Control Observation Checklists.

- Based on the forms we received, the vast majority of Enumerators demonstrated an understanding of the Update/Leave procedures and had a satisfactory first or second Initial Observation (97.17 percent of Production Enumerators and 98.21 percent of Quality Control Enumerators).

- The most common error observed for Production Enumerators was failing to enter the correct action code of the Address Listing Page. The most common Quality Control Enumerator error observed was failing to show census identification and provide a copy of the Confidentiality Notice to each respondent.

Dependent Quality Control Description and Results

Following the initial canvass completed by the Production Enumerators, the Quality Control Enumerators conducted a dependent check of a sample of housing units in every Assignment Area, recording the results on an Update/Leave Dependent Quality Control Form (Form D-1190 (UL)). The purpose of the Dependent Quality Control check was to verify the accuracy of the address information and map spots collected during the Production phase of the field work. A starting unit randomly selected within each Assignment Area was noted on the Dependent Quality Control Form.

The Quality Control Enumerator canvassed the Assignment Area, beginning with the selected starting unit, until reaching the allotted sample size. The Quality Control Enumerator then determined whether the Assignment Area passed or failed the quality check based on the errors recorded during canvassing. If the Assignment Area binder passed the check, it was sent to the Local Census Office for review. However, if the Quality Control Enumerator found too many errors and the Assignment Area binder failed the check, the Quality Control Enumerator immediately recanvassed the remainder of the Assignment Area prior to submitting the Assignment Area binder to the office. Detailed below are the results of the Dependent Quality Control check:

- The Paper-Based Operations Control System recorded that all 202,890 Assignment Areas were worked during the quality check (with one Assignment Area missing a result). We received data from 199,981 keyed Dependent Quality Control forms, which is 98.57 percent of the unique Assignment Areas.

- Quality Control Enumerators checked 14.49 percent of all addresses canvassed during the Update/Leave Operation. This was less than the 17.60 percent we estimated for the Update/Leave budget. Approximately eight percent (7.88 percent) of the addresses canvassed during the Update/Leave Operation were checked during the Dependent

Quality Control check. An additional seven percent (6.61 percent) of the addresses were recanvassed.

- Approximately 99 percent of the Assignment Areas were sampled correctly, according to an analysis of the Dependent Quality Control Forms containing a sample size and Assignment Area housing unit count. The sample size discrepancies were most likely a result of keying errors.

- According to the Dependent Quality Control information captured in the Paper-Based Operations Control System, the average Assignment Area size was 62 housing units and a Production Enumerator completed an average of five Assignment Areas. A Quality Control Enumerator completed an average of 21 Assignment Areas.

- Between six and seven percent of the Assignment Areas failed the Dependent Quality Control check (6.03 percent captured in the Paper-Based Operation Control System and 6.68 percent captured from the forms at the National Processing Center). According to the data captured in the Paper-Based Operations Control System, 9,560 (22.59 percent) of all Production Enumerators worked at least one Assignment Area that failed the Dependent Quality Control check.

- The most common critical error recorded during the Dependent Quality Control check (40.16 percent of the total recorded critical errors) was a Production Enumerator removing the address from the universe (delete, duplicate, uninhabitable, empty mobile home site, or nonresidential) when it should have been verified or corrected. The most common noncritical error recorded during the Dependent Quality Control check (33.97 percent of the total recorded noncritical errors) was a Production Enumerator making or not correcting an error with a map spot number.

Crew Leader and Office Review Description and Results

Following the Quality Control field work, the Assignment Area binders were submitted first to the Crew Leader for an informal review and then to the Local Census Office for a final formal review. The office clerks completed the D-446 (UL), Office Review Checklist, recording any errors found in the Assignment Area binder. The office clerk fixed all issues that could be resolved in the office. If the Assignment Area binder contained no errors or only errors that could easily be resolved in the office, the Assignment Area binder passed the Office Review and was prepared for shipping. The Assignment Area binder was checked out to the Quality Control Crew Leader for repair if a field visit was needed to fix the errors found in the Assignment Area binder. Once the errors were fixed, the Assignment Area binder was sent back to the office for a second Office Review. Regardless of the result of the second review, the Assignment Area binder was prepared for shipping. Detailed below are the results of the Office Review(s):

- We received data from a total of 161,088 data-captured Office Review Checklists, 79.40 percent of the Assignment Areas, although the Paper-Based Operations Control System contained the results for all 202,890 Assignment Areas.

- Less than six percent of the Assignment Areas failed the first Office Review (4.91 percent captured in the Paper-Based Operations Control System and 5.74 percent captured from the forms keyed at the National Processing Center).

- According to the data captured from the Office Review Checklists at the National Processing Center, about ten percent (1,188 of the 11,737) of the Assignment Area binders failed the second Office Review and were shipped with errors that the office clerks could not fix.

Recommendations:

We recommend a similar Quality Control program for Update/Leave along with the following suggestions for improvement:

- **Test the Update/Leave Operation as it will be implemented in the field. Due to budget constraints, the 2008 Census Dress Rehearsal of the Update/Leave Operation was canceled. As a result, the addition of a separate Quality Control staff was never tested in the field.**

- **Automate the listing and mapping of the 2020 Update/Leave Operation. Quality estimates can then be more timely and complete.**

- **Conduct the Initial Observations using an automated instrument. Automation will reduce problems with missing forms, unobserved Enumerators, missing data on the forms, and correct the most common errors captured during the Initial Observations.**

- **If automation is impossible, affix a barcode label on each form and track all of the Quality Control forms. Allow for the control information (such as Local Census Office code) to be pre-printed on the forms and transfer the information to keying. Stress the importance of completing all information on the Quality Control forms and submitting the forms to be data captured.**

- **Establish an Update/Leave Quality Control sub-team to meet during the planning, testing and implementation phases of the operation, to aid in material development and to monitor the quality of the work completed in the field.**

- **Consider tracking Update/Leave and Urban Update/Leave addresses separately for Quality Control analysis, since they encompass two distinctly different types of address areas.**

- **Determine ways to closely track the field work during the field operation in order to monitor any falsification or procedural issues that may arise during Production. For example, generating control charts based on the Dependent Quality Control fail rates.**

- **Provide capability to capture two observation results, the first observation and the second observation, on the Observation Checklist, D-1222 (UL).**

- **Determine and include the data capture experts during the forms design process.**

- **Determine a better way to include the blocks with no housing units in the starting unit selection for the Dependent Quality Control check.**

- **Consider developing and implementing a verification plan for clerk data entry into the Operations Control System in the Local Census Offices, such as a quality check on keying the Dependent Quality Control pass/fail decision.**

- **Ensure the distribution of Assignment Area sizes used when calculating the weighted Average Outgoing Quality Limit accurately reflects the distribution of Assignment Areas sizes planned for the field operation.**

- **Determine the desired outgoing quality achieved during the Dependent Quality Control check, instead of dictating the Dependent Quality Control check sample percent based on the budget alone.**

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I. Introduction

A. Scope

The purpose of the 2010 Census Update/Leave (U/L) Quality Profile is to provide the results of the 2010 U/L Quality Control (QC) program, as well as recommendations for future census operations.

B. Intended Audience

The intended audience of this report includes program managers and staff responsible for planning the 2020 Census and mid-decade tests.

II. Background

A very important job of the Census Bureau is to conduct a census every ten years to provide a count of persons living within the United States (U.S.) and Puerto Rico (P.R.). The enumeration methods and the questionnaire content have changed over the years, but the need to provide a count of all persons has not changed. The U/L Operation emerged as an alternative to the Mailout/Mailback Operation as a way to ensure questionnaires were delivered to each unit in difficult to locate areas without the extra in-person enumeration expense. The Census Bureau initially conducted U/L to update the address list and census maps, and deliver questionnaires to housing units (HUs) in predominantly rural areas (Pennington, 2003). The Urban Update/Leave (UU/L) Operation started as a special enumeration procedure and was implemented in response to large apartment complexes with a single mail drop point not always accurately distributing preaddressed questionnaires to the correct units (Rosenthal, 2002). Both U/L and UU/L were implemented in the 1990 Census and again in Census 2000.

Census Bureau staff tested procedural updates of U/L in two U/L sites in the 2004 Census Test[1]. The Census Bureau intended to include the U/L Operation (and possibly the UU/L Operation) in the 2008 Dress Rehearsal, but the U/L portion of the dress rehearsal was canceled due to budgetary constraints. The only major change from the 2004 Census Test to the 2010 Census U/L Operation was the decision to have a separate field staff focused on conducting the QC operation (Matching, 2003).

The Address Canvassing Operation, conducted in the spring of 2009, was the first listing field operation for the 2010 Census[2], paving the way for the remaining 2010 Census operations. Address Canvassing Listers initially canvassed the entire U.S. and P.R. (excluding Remote Alaska and Remote Update Enumerate areas), using hand-held computers to capture and correct address information and maps in order to prepare for the

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[1] See DSSD 2004 Census Test Memorandum Series No. B-24, Quality Control Profile for the 2004 Update/Leave Operation by Marquette, for more information on the QC program.

[2] The 2010 Census of the Island Areas (U.S. Virgin Islands, American Samoa, Guam and the Commonwealth of the Northern Mariana Islands) was conducted separately from the 2010 Census of the United States (U.S.) and Puerto Rico (P.R)., and is out of scope for the purposes of this paper.

delivery of the 2010 Census questionnaires. During the second largest listing operation, U/L, census Enumerators located living quarters in areas where it was hard to mail out questionnaires and physically drop off questionnaires to the residents. The 2010 Census U/L Operation had a separate QC staff and combined U/L and UU/L into one operation for simplicity. Detailed below is a high level explanation of the 2010 Census Update/Leave Operation as well as the QC program.

A. 2010 Census Update/Leave Operation

The 2010 Census U/L Operation had two primary goals:

- Verify and, if necessary, update the address list for every living quarter in the U/L universe to be used in later 2010 Census operations.

- Leave a 2010 Census questionnaire at each HU for the respondent to mail back to the Census Bureau.

The 2010 Census U/L Operation was conducted in 304 out of a total of 494 Local Census Offices (LCOs) across the U.S. and P.R. in Type of Enumeration Area (TEA) 2 and TEA 7[3]. TEA 2 contained rural areas and was made up primarily of HUs without city-style addresses. TEA 7 contained urban areas where the Census Bureau was unsure of accurate mail delivery and severely impacted areas as a result of natural disasters, such as hurricane-devastated New Orleans.

Geography Division divided the workload for each LCO into manageable work units termed: Assignment Areas (AA). Based on past census field operations and expected results, Field Division determined the average AA size. Each AA was made up of smaller geographical units called blocks. Production Enumerators used the Address Listing Pages and maps from previous census operations (most recently from Address Canvassing conducted in 2009), which were stored in AA binders, to help locate each AA. The Enumerators systematically canvassed every block, searching for living quarters where people lived, stayed, or could have lived or stayed within each AA in the U/L universe. At each living quarter, Enumerators verified or updated the Address Listing Pages in the AA binder, as well as the corresponding Block Maps. Enumerators updated the Address Listing Pages and maps and dropped off questionnaires at all units originally defined as HUs. Previously defined Group Quarters (GQs) and Transitory Locations did not receive questionnaires during the U/L Operation, but any new Other Living Quarters (OLQs) were listed on a special Add Page and eventually sent to GQ Enumeration. The LCOs tracked the work of the AA binders through the Paper-Based Operations Control System (PBOCS). The U/L field operation and the associated field QC operation, Dependent Quality Control (DQC) check, occurred between March 1, 2010 and April 2, 2010.

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[3] Although TEA 2 and TEA 7 signify the U/L areas and the UU/L areas, respectively, for the purposes of the 2010 Census operation both TEAs were termed U/L.

B. Update/Leave Quality Control Program

The LCOs hired two separate staffs to conduct the U/L Operation, a Production and a QC staff. The main objective of the QC program was to ensure the address list and the maps were updated correctly and legibly. The QC program consisted of four components:

- AA Binder Assembly Check
- Initial Observation of Enumerators
- DQC check of each AA
- Crew Leader and Office Review

A brief explanation of each major component of the QC program for U/L is provided below. For more information on any of the QC operations, refer to 2010 Decennial Census Memorandum Series Document #F-12 entitled "2010 Census: Quality Control Plan for the Update/Leave Data Collection Operation." (Haas, 2009)

1. AA Binder Assembly Check

   Prior to the start of the U/L Operation, all of the AA binders were assembled in the LCOs. The AA binders contained the following items:

   - D-451 (UL), Update/Leave Cover/Daily Log
   - D-101A.2, Special Notice Page
   - D-114 (UL), Block Listing Page
   - D-105A (UL), Update/Leave Address Listing Pages
   - D-105B (UL), Update/Leave Add Page for Housing Units
   - D-105C (UL), Update/Leave Add Page for Other Living Quarters
   - Map pouch, which contained the following items:
     - Map legend
     - One AA Locator Map
     - One AA Map

- One Block Map for each block in the AA

A QC office clerk conducted a binder assembly check on a sample of AA binders, in order to make sure the AA binders were assembled properly and contained all of the required materials. This step was especially important for the 2010 Census due to issues with the late delivery of materials, such as the map pouches, and the substitution of the binders originally planned for. The binders originally selected to be used during U/L were not the same as the binders ordered. Due to a difference in size of binders, this required LCO staff to split some AAs into two or more binders and make other adjustments to the assembly process. The QC office clerk used the form D-972, AA Binder Assembly QC Checklist (shown in Appendix A), to keep track of the verified AA binders. The binder assembly check was not a formal QC, but was instead a tool for the office to minimize delays in the field work due to wrong or missing materials. Therefore, we did not collect any data from the AA binder assembly check. At the end of the U/L Operation, the AA Binder Assembly QC Checklists were destroyed in the LCOs.

2. Initial Observation

The Initial Observation component of the U/L Operation was conducted after the completion of training. The CLs trained all of the Enumerators before they were permitted to work in the field. In order to ensure the Enumerators understood all of the procedures necessary to complete the required work, the CL[4] observed each Enumerator as soon as possible after training. Although Initial Observations are included in the QC program, they were not performed entirely by the separate QC staff: the Production CLs conducted an Initial Observation of each of the Production Enumerators, and the QC CLs conducted an Initial Observation of each of the QC Enumerators. The Initial Observation was designed as an extension of training, rather than a test of the Enumerator's abilities.

The Production CLs and QC CLs completed the Observation Checklist, D-1222 (UL) (see Appendix B and Appendix C for an illustration of the U.S. and P.R. forms), for each Enumerator and QC Enumerator, respectively, to ensure he or she understood the canvassing and listing procedures. The Production CLs observed the Production Enumerators list or update at least ten addresses or for two hours, whichever came first. The QC CLs observed the QC Enumerators work all of the addresses in at least one DQC assignment. The Observation Checklist contained 20 common critical mistakes the Production and QC Enumerators could make

[4] The Crew Leader Assistants (CLAs) also observed Enumerators. When referring to the Initial Observation, CLAs can be substituted for CLs.

while completing an AA. The CL[5] checked the corresponding box, "Y," "N," or "N/A"[6] based on the Enumerator's performance. During the Initial Observation, the CL provided feedback and instruction to correct errors made in the field.

At the end of the observation, the CL checked the appropriate result in Section C of the Observation Checklist. The possible results were "Satisfactory," "Unsatisfactory," and "Other." If the CL believed the Enumerator demonstrated an understanding of the procedures, the Enumerator received a "Satisfactory" and could continue work for the U/L Operation. If the Enumerator's performance was unsatisfactory during the first observation, the CL consulted with his/her supervisor. If the supervisor believed the Enumerator did not adequately understand the procedures, but felt the Enumerator's performance could be improved after providing additional training, he or she would instruct the CL to conduct a second observation. Otherwise, the CL's immediate supervisor instructed the CL to mark "Unsatisfactory," and the Enumerator was terminated.

If the CL conducted a second observation, he or she marked the results for the second observation only in Section C. The CL was instructed to wait to mark the results until the second Initial Observation was completed. If, even after a second observation, the CL believed the Enumerator did not understand the procedures, the result of the Enumerator's Initial Observation was "Unsatisfactory" and he or she was to be terminated. If the Enumerator was not observed because they resigned or were terminated prior to being observed, the CL marked "Other." After the CL completed the Observation Checklist for an Enumerator, an office clerk filed the form at the LCO until the end of the operation. At the close of the U/L Operation, the Observation Checklists were shipped to the National Processing Center (NPC) for data capture so that the information could be analyzed at HQ. The results of the Initial Observation analysis can be found in Section V.A on page 21.

3. Dependent Quality Control Check

The DQC, the quality check of the Address Listing Pages and maps that were updated during the Production phase of the U/L Operation, was conducted March 8, 2010 to April 2, 2010, beginning one week after production field work started. During the DQC, the QC Enumerator revisited a string of addresses in every AA to check the Production

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[5] Although the tasks observed were different for Production and QC Enumerators, the procedures for collecting data during the observations were the same. From this point on, "CL" applies to both the Production CL and the QC CL and "Enumerator" applies to both the Production and the QC Enumerator.

[6] "N/A" means "Not Applicable."

Enumerator's address listing work. QC Enumerators checked all AAs worked in the U/L Operation during the DQC phase. After a Production Enumerator canvassed an AA, the AA binder was returned to the LCO. Prior to the start of the DQC, the following steps were completed in the LCO:

- An office clerk checked in the AA binder from Production and keyed the number of HUs and OLQs added by the Production Enumerator. These were HUs that were not previously existing on the Address Listing Page and discovered during Production U/L field work.

- PBOCS selected a random unit in the AA to begin the DQC canvass between one and the total number of addresses in the AA binder, including the count of the added HUs and OLQs and the blank blocks, i.e., blocks with no addresses pre-printed on the Address Listing Page at the start of the operation.[7]

- PBOCS generated the D-1190 (UL) DQC form (see Appendix D and Appendix E for examples of both U.S. and P.R. forms) for the QC Enumerator to use during the DQC.

- An office clerk printed and inserted the DQC form between the Special Notice Page and the Block Listing Page near the front of the Address Listing Pages in the AA binder.

- An office clerk circled the starting unit on the Address Listing or Add Page to aid the QC Enumerator in finding the starting unit.

- An office clerk checked the AA binder out to the field.

a) Selecting the DQC sample size

We used an Average Outgoing Quality Limit (AOQL) sampling plan to set the sample size and the allowable critical and noncritical errors for the DQC phase. The given AOQL represents the worst quality of address information we expected over all AAs at the end of the U/L Operation (both Production and QC listing). The specific AOQL plan is given in Table 1. The table was adjusted so that an AA with one unit would have a sample size of one and an AA of two HUs would have a sample size of two.

[7] In the U/L AA binders, each blank block was noted in a line on the Address Listing Page and so each blank block represented one HU. During the DQC even a blank block was eligible to be selected as the starting unit. If selected, the QC Enumerator canvassed the block to ensure no units existed.

Table 1: Sample Sizes and Allowable Errors – AOQL for Update/Leave

Total Units in AA	DQC Sample Size	Allowable Critical Errors	Allowable Noncritical Errors
x <= 50	3	0	1
50 < x <= 100	5	0	1
100 < x <=150	8	0	1
150 < x <= 175	9	0	1
175 < x <= 200	10	0	1
200 < x <= 275	14	0	1
275 < x <= 500	25	1	3
500 < x <= 1000	50	2	5
1000 < x <= 1500*	75	4	8

*If an AA contained more than 1,500 units, the DQC sample size was 75 units.

According to the table, if an AA contained 65 HUs, then five HUs would be selected for the DQC sample. If the QC Enumerator encountered any critical errors or more than one noncritical error, the AA would fail DQC and be immediately recanvassed by the QC Enumerator.

The U/L budget allowed for a five percent sample of addresses across all AAs. The sample size of each range of total units in the AA was five percent of the maximum size of the range, so some AAs had slightly more than five percent of the HUs sampled.

We set the allowable critical errors to achieve the lowest AOQL that is practical based on the five percent sample size budgeted for the operation. The selected plan had an overall weighted AOQL of 5.5 percent for critical errors.

We set the number of allowable noncritical errors to be 0.5 percent of the upper bound of the range, with a minimum of one allowable error. This produced an overall weighted AOQL of 15.2 percent for noncritical errors.

b) DQC Field Work

The DQC form contained the line number and type of page, listing page or add page, of the starting address of the sample, the number of HUs to be canvassed, and lines to record information about each unit they checked. The QC Enumerator began the DQC with the indicated starting unit and then followed the same canvassing procedures as the Production Enumerator, canvassing clockwise, until he or she reached the sample size indicated on the form. The QC Enumerator worked ground to book, checking to see what was on the ground and comparing it to what was captured on the

Address Listing Pages, Add Pages, and Block Maps. If the QC Enumerator found a discrepancy between what they observed on the ground and what was provided on the listing and maps, he or she updated the Address Listing Pages, Add Pages, or maps following the same procedures the Production Enumerator used to initially update the materials. The QC Enumerator then recorded information for each checked unit including the line number and page type of the unit in the AA binder, both the Production and QC action codes, and any critical and noncritical errors found based on the Production Enumerator's initial canvass, on the DQC form. Once the QC Enumerator reached the DQC sample size, he or she determined the outcome of the DQC.

c) Outcome of the DQC and Form Disposition

After the QC Enumerator checked all of the HUs in the sample, he or she used the allowable number of critical and noncritical errors printed on the DQC form to decide whether the AA passed or failed DQC. If the number of errors exceeded what was allowed for the AA, based on the size, the AA failed DQC and the remaining HUs in the AA were immediately recanvassed by the QC Enumerator. After an AA either passed DQC or failed and was recanvassed, the QC Enumerator returned the AA binder to his or her QC CL for review. The QC CL returned the AA binder to the LCO and an office clerk captured the results of the DQC pass/fail decision in PBOCS. When an AA was completed in both the field and in the office, the LCO shipped the AA binder to NPC for data capture. NPC staff removed the DQC form from the AA binder and captured the data from the DQC forms. The results of the DQC analysis can be found in Section V.B on page 38.

4. Crew Leader Review and Office Review

CLs and LCO clerks reviewed the materials turned in by the Enumerators. The first stage of review was the CL review. Between each phase of the field operation, the CL reviewed the AA binders completed by the Enumerators using the same criteria as the Office Review (described in the next paragraph). This review included associated maps and DQC forms, when applicable. The purpose of the CL review was to make sure all of the materials were completed and legible prior to being submitted to the LCO.

After the CL reviewed the AA binders, he or she returned them to the LCO for a more formal review, the Office Review. Office staff filled out the D-446 (UL) Office Review Checklist (see Appendix F and Appendix G for the U.S. and P.R. versions of the form) to verify all of the materials

were complete and legible. If the office staff found no problems with the AA binder or if the errors were easily fixed in the office, the AA binder passed the Office Review and was prepared for shipping to NPC for data capture. If there were too many problems with the AA binder that could not be fixed in the office and needed clarification from the field, the AA binder was sent back to the QC CL for repair. Once the office staff received the AA binder following the repair, a second review was conducted to make sure the AA binder was updated, and the results were recorded on the same Office Review Checklist. Due to time and budget constraints, the office staff prepared the AA binder for shipping to NPC regardless of the result of the second Office Review. Therefore, the AA binders received at NPC contained less than five percent critical errors if they passed the first or second Office Review, and possibly more if they failed the second Office Review.

Initially, the Office Review Checklists were supposed to be destroyed in the LCOs at the close-out of the U/L Operation. The development of a 2010 Census Evaluation comparing the benefits of automated compared with paper operations (Address Canvassing and U/L) created the need for the data contained on the Office Review Checklist to be data captured. The LCOs filed the forms for the duration of the U/L Operation and shipped the Office Review Checklists to NPC for data capture, in addition to the Observation Checklists, at the close-out of the operation. The results of the Office Review analysis can be found in Section V.C on page 60.

III. Methodology

This section describes the methods used to analyze the QC data collected during the Initial Observation(s), the DQC, and the Office Review(s).

A. Questions to be Answered

The following questions were listed in the "2010 Census: Quality Control Plan for the Update/Leave Data Collection Operation" (Haas, 2009).

Initial Observation Results

1. How many Enumerators (production and QC) worked on U/L?

2. How many Enumerators (production and QC) were observed?

3. What was the final outcome of the Initial Observation for both Production and QC?

4. What is the distribution of errors committed by the Production Enumerator during the Initial Observation?

5. What is the distribution of errors committed by the QC Enumerator during the Initial Observation?

6. How many Enumerators (Production and QC) failed the first Initial Observation (did not receive a second Initial Observation)? Of these, what final employee status did the Enumerator have?

7. How many were retrained as a result of failing Initial Observation?

DQC Results

1. How many Enumerators worked on U/L?

2. How many Enumerators were checked through the DQC?

3. How many total units were listed for U/L?

4. How many units were checked through the DQC (in total)? What percent of total?

5. How does this compare to our budget/plan?

6. Was the sampling plan implemented correctly?

7. How many AAs were listed?

8. How many AAs were checked in DQC? What percent?

9. How many AAs failed? What percent?

10. What was the incoming error rate?

11. What was the outgoing error rate?

12. How many and what kind of critical errors were there?

13. How many and what kind of noncritical errors were there?

14. What AOQL was the sample designed to achieve? Explain what AOQL means in simple terms in the context of U/L.

15. What is the time lag between when the Production work units (AAs) were completed and the DQC work units (AAs) were started in the field (production check-in to DQC check-out)?

16. What is the time lag between when the production work units were completed and the DQC work units were completed in the field (production check-in to DQC check-in)?

17. How long did it take to complete the Production work units in the field (production check-out to production check-in)?

18. How long did it take to complete the QC work units in the field (DQC check-out to DQC/recanvass check-in)?

In addition to the above questions outlined in the QC Plan, we also answered the following questions using the data captured from the Office Review.

Office Review Results

1. How many AAs were checked during the Office Review(s)? What percent of the total?

2. How many AAs passed the Office Review? Were sent out for repair? Failed the second Office Review?

B. Methods

We answered the questions primarily using two sources of data. The first source was the data captured in PBOCS by the office clerks in the LCOs during the operation. The second source was a set of files of keyed data NPC staff captured after close-out of the U/L Operation. NPC keyers followed the instructions detailed in each of the form's keying specifications. They followed the keying QC plan explained in the DSSD 2010 Decennial Census Memorandum Series #F-11, "Quality Control Specifications for the 2010 Census Key-From-Paper Operations" (Marquette, 2009). Ten percent of the fields were verified[8] and the keying QC plan ensured a one-percent AOQL on field-level keying errors (Marquette, 2009).

In addition to the two primary sources, we used data from the Decennial Applicant, Personnel and Payroll System (DAPPS), data contained in the Decennial Management Division (DMD) budget proposal, and address data from both the enumeration file that populated the original Address Listing Pages and the Master Address File (MAF) extract created after canvassing was completed. We planned on generating control charts to track the DQC failure rates during the

[8] The Puerto Rico Observation Checklists were 100% verified since the workload was small.

U/L Operation using DMD's Cost and Progress (C&P) system as well; however, the C&P progress reports were not released during the course of the U/L Operation. This restricted our data analysis primarily to information we received after the operation was completed.

In order to accurately report the summary statistics that follow in this report, some of the data from the keyed files required cleaning. See Section V of this profile for more information. Described below are the data we used to answer each of the study plan questions.

1. Initial Observation Questions

   At the end of the U/L Operation, the LCOs shipped the completed Observation Checklists to NPC for data capture. After the original close-out date for data capture, LCOs continued to locate and ship U/L Observation Checklists to NPC. We extended NPC data capture three months, in hopes of capturing all of the Observation Checklists. NPC keyed 26,782 Observation Checklists and sent headquarters (HQ) a file of the data captured from these forms. NPC continued to receive forms and shipped 280 additional Observation Checklists to HQ via Federal Express following the close-out of data capture. We excluded the 280 Observation Checklists from the analysis contained in this document, since they were received too late to process prior to preparing this report. We provided basic summary statistics for these additional forms in Appendix H. After all data cleaning, we used 23,817 Observation Checklists in our analysis. The Observation Checklist file contained control information, the result of each observed task, the result of the Initial Observation, and any notes the CL may have captured during the Initial Observation.

   In addition to the NPC-keyed data file, we used a data file extracted from DAPPS containing a list of terminated Enumerators. The file contained the Production and QC Enumerator applicant identification (ID) numbers, the LCO codes, and the dates of termination. We used the dates of the U/L Operation to determine which Enumerators to include from the DAPPS file. We compared the outcomes of the Initial Observations with the final employee status of the Enumerators.

   Table 2 displays the sources used to answer each of the Initial Observation questions.

Table 2: Data Sources Used to Answer Initial Observation Questions

#	Initial Observation Questions	Data Sources		
		PBOCS	NPC	DAPPS
1	How many Enumerators worked on U/L?	✓		
2	How many Enumerators were observed?		✓	
3	What was the final outcome of the Initial Observation for both Production and QC?		✓	
4	What is the distribution of errors committed by the Production Enumerator?		✓	
5	What is the distribution of errors committed by the QC Enumerator?		✓	
6	How many Enumerators failed the first Initial Observation? Of these, what final employee status did the Enumerator have?		✓	✓
7	How many were retrained as a result of failing Initial Observation?		✓	✓

2. Dependent Quality Control Questions

The LCOs used the paper-based operations control system, PBOCS, to keep track of the AA binders during each phase of the U/L Operation. The clerks used PBOCS to record applicant IDs, the phase of the operation, check-in and check-out dates and times, the number of added units, the results of the DQC, and the results of the Office Review(s). The clerks used PBOCS to generate and print the DQC forms in the LCOs. HQ staff tracked the progress of U/L by reviewing the reports generated in PBOCS such as the D-370E (UL) Regional Census Center Progress Report. At the close of the operation, we received an AA-level file containing data captured during the course of the operation. This file contained the aforementioned information captured in the office during the course of the U/L Operation, including the DQC results for all 202,889 AAs worked[9].

In addition to the PBOCS DQC file, we received three files captured from the DQC form by NPC keyers. After the field and office work were completed for an AA, the LCO office staff shipped the AA binder containing the DQC form to NPC. NPC staff removed the DQC form from each AA binder and sent it for keying.

The DQC form was between one and seven pages, depending on the size of the AA. Due to the difficulty involved in keeping seven pages of the same form together during check-in, batching and keying, NPC captured three separate files for each individual page of the DQC form. NPC keyed the DQC forms based on the three primary sections possibly appearing on

[9] Although the PBOCS DQC file contained data for all of the 202,890 AAs, the file was missing the DQC result for one AA.

each page of the form:

- The first file was a page-level file consisting of the pre-printed control header information including items such as the LCO code, the AA code, the Production Enumerator applicant ID, the number of addresses in the AA, and the starting unit line number in the AA binder. Every page of the DQC form contained this header section.

- The second file was a unit-level file containing the data from the rows in the table. The unit-level file contained items such as the line and page number of the unit in the AA binder, the Production and QC Enumerator action codes, and the critical and noncritical errors. There was one record on the file for each unit worked during the DQC. The majority of the forms contained at least one row of data, though not all did. A page contained at most seven rows due to the design of the DQC form.

- The third file contained the results of the DQC, including the QC Enumerator name and applicant ID, the pass/fail decision, and the date the DQC was completed. Only the last page of a DQC form contained the footer section of the DQC form. Each footer record represented the results of one DQC form, or one AA.

Each of the three files contained the LCO code and the AA code so the data could be matched back together after keying. A QC Enumerator should have only completed one DQC form per AA. We received data from 233,460 DQC pages. After removing the duplicate pages and duplicate data for some AAs, our NPC-captured DQC file contained data for 199,981 unique AAs, although we expected to receive forms for 202,848 AAs[10].

In addition to the PBOCS DQC file and the NPC DQC form data files, we used three other sources to capture the responses to the DQC study plan questions. The three additional sources were data used to create DMD's Cost Model for planning the U/L Operation, the enumeration file used as the starting address list in the AA binders, and the MAF extract.

Table 3 displays the sources used to answer each of the DQC questions.

[10] Forty-two of the 202,890 AA binders were never received at NPC, and therefore, our expected DQC form count was reduced to 202,848.

Table 3: Data Sources Used to Answer DQC Questions

#	DQC Questions	Data Sources		
		PBOCS	NPC	Other*
1	How many Enumerators worked on U/L?	✓		
2	How many Enumerators were checked through the DQC?	✓	✓	
3	How many total units were listed for U/L?	✓	✓	✓
4	How many total units were checked through the DQC? What percent of total?	✓	✓	
5	How does this compare to our budget/plan?	✓	✓	✓
6	Was the sampling plan implemented correctly?		✓	
7	How many AAs were listed?	✓		✓
8	How many AAs were checked in DQC? What percent?	✓	✓	
9	How many AAs failed? What percent?	✓	✓	
10	What was the incoming error rate?		✓	
11	What was the outgoing error rate?		✓	
12	How many and what kind of critical errors were there?		✓	
13	How many and what kind of noncritical errors were there?		✓	
14	What AOQL was the sample designed to achieve? Explain what AOQL means in simple terms in the context of U/L.		✓	
15	What's the time lag between when the Production work units were completed and the DQC work units were started in the field?	✓		
16	What's the time lag between when the Production work units were completed and the DQC work units were completed in the field?	✓		
17	How long did it take to complete the Production work units in the field?	✓		
18	How long did it take to complete the QC work units in the field?	✓		

*The Other category represents any source other than the PBOCS DQC file and NPC file used in answering the DQC questions.

3. Office Review Questions

The PBOCS DQC file contained the results of the first and second Office Review in addition to the DQC results. Unfortunately, there were problems with the capture of the second Office Review results in PBOCS, so we could not determine how often an AA binder failed the second Office Review. Therefore, we used the PBOCS file as a source of the pass/fail decision for the first Office Review only.

As with the Observation Checklists, the LCOs shipped the Office Review Checklists to NPC for data capture after the U/L Operation. NPC encountered difficulty locating Office Review Checklists for all of the AAs. Although the LCOs were instructed to ship the forms separately, some of the AA binders contained the Office Review Checklists. NPC

keyed the forms they were able to locate. We received one file of all of the Office Review Checklists shipped to NPC. This file contained control information about each AA, the errors encountered during the Office Review(s), and the pass/fail decision of the first and, if necessary, second Office Review.

NPC received Office Review Checklists after the close-out of data capture and shipped the forms to HQ. We received a file containing 160,327 keyed Office Review Checklists. HQ staff received and keyed 19 forms, and received an additional 742 forms they did not key. Since the Office Review Checklists were captured for an evaluation comparing automation and paper operations, the data included in this report were pulled from the analysis already completed for the evaluation. As a result, unlike the Observation Checklists and DQC forms, the Office Review Checklists were not unduplicated and the data were used as is. We used the data from the first Office Review of 160,346 keyed forms in our analysis. In addition, the forms we received contained data for 11,737 second Office Reviews. The data-captured results of the second Office Reviews were included in our analysis.

Table 4 displays the sources used to answer each of the DQC questions.

Table 4: Data Sources Used to Answer Office Review Questions

		Data Sources	
#	**Office Review Questions**	**PBOCS**	**NPC**
1	How many AAs were checked during the Office Review(s)? What percent of the total?	✓	✓
2	How many AAs passed the Office Review? Sent out for repair? Failed the second Office Review?	✓	✓

IV. Limitations

This section documents the assumptions made and the limitations in analyzing the results of the Initial Observation(s), the DQC, and the Office Review(s) that may affect the interpretation of the results.

A. Initial Observation Form

NPC Observation Checklist File

- NPC received 26,782 U/L Observation Checklists from the LCOs. The analysis of these forms will be limited to those sent to NPC and data captured. We can only speculate the reasons these forms were not sent to NPC, for example:
    - Observation Checklists were not completed in the field as instructed,

  - CLs did not understand how to complete the forms given a large number of the forms had missing information, or
  - They were lost during the shipping from the LCO to NPC.

- We removed all of the forms with missing applicant IDs and inconsistent type of observation codes, since the applicant ID and type of observation were the variables used to determine a unique form.

- The Observation Checklist allowed space for a CL to conduct two Initial Observations on the same form. Often times the CLs completed the second (third, fourth, etc.) observation on an additional form. As a result, we received multiple forms completed for the same Enumerators. We tried to combine data for the same Enumerator, but we had difficulty interpreting the results of the Initial Observations.

- We designed the Observation Checklist so it could be used for both types of Enumerators. If a CL used the same form to record data for an Enumerator who worked both Production and QC, the form presented a complication, since the form allowed for only one recorded result. There was no way to interpret what the result should have been for each of the two types of observations if the CL checked both Production and QC tasks, so we had to remove these forms from our analysis.

- Other field operations had an Initial Observation. There may be U/L observations completed on forms for other operations which we did not receive.

- NPC located and received U/L QC forms months after the operation was over. We extended the data capture close-out of the QC forms from June 4 until September 17 to account for the late arrivals. NPC continued to receive Observation Checklists after the data capture close-out, and the remaining 280 forms were shipped directly to HQ and were not included in the analysis.

PBOCS DQC File

- We used the data file we received from PBOCS to determine the number of Enumerators. Every AA in the PBOCS DQC file had one Production Enumerator and one QC Enumerator associated with it. We have no way of determining if the LCO clerks assigned the AAs to the appropriate Enumerators in PBOCS. There is evidence that some of the LCOs assigned all of the AAs to one CL in order to quickly assign work. For instance, our results show one Production Enumerator worked 289 AAs. There may be more Enumerators who we are not accounting for in our analysis.

DAPPS File

- We used a data file from DAPPS to help determine how many U/L Enumerators were terminated after failing their Initial Observation. We could not specifically select Enumerators who worked during the U/L Operation, but instead selected Enumerators that were terminated between March 1, 2010 and April 10, 2010 (about a week after the U/L Operation closed out). The DAPPS data file contained only 29,543 unique applicants, equating to less than half of the unique number of Enumerators PBOCS indicated working during U/L (51,200 Enumerators).

- DAPPS does not capture the reason an applicant was terminated, so we cannot confirm whether a person was released for poor performance. In particular, at the end of the U/L Operation, a lot of the Enumerators were terminated due to lack of work. As a result, the closer the date in the DAPPS file was to the end of the operation, the less likely the termination date corresponds to the outcome of the observation.

- We made the assumption that termination as a result of an "Unsatisfactory" or failed observation occurred within one week of the observation. In doing so, we may have misidentified the employee status of an Enumerator following an observation, but this was the best assumption we could make given the data we received.

B. Dependent Quality Control Check

Both sources of DQC data contained flaws that impact the results in this report. Detailed below are the limitations with using data collected from the DQC field operation. All of the results in the report should be used with consideration of the errors in the data.

PBOCS DQC file

- Some of the overarching flaws with the data received from PBOCS are a result of the following: shortened development time of the contingency plan, PBOCS was not thoroughly tested prior to deployment, and none of the data keyed or scanned into the system were checked for quality in the LCO. The specifics of these flaws are described in subsequent limitations.

- As explained in the Observation Checklist section, AAs may have been incorrectly assigned to Enumerator in PBOCS. The Production Enumerator applicant IDs in PBOCS were also recorded on the DQC forms, so any Production Enumerator assignment errors could have also appeared on these forms.

- The number of added HUs and OLQs as well as the DQC results could have been keyed incorrectly, since the keying of these data were not monitored or checked for accuracy.

- The instructions supplied for working a block with zero units may have caused difficulty in the field.

- PBOCS used the number of lines filled in on an Address Listing Page instead of the total number of units in an AA, to determine the starting DQC unit and stored this number instead of the total number of units in an AA in the DQC results file. This made calculating exact workloads impossible.

- One AA binder was processed all the way through the U/L Operation and shipped to NPC without having a DQC result captured in PBOCS. This should not have been possible.

- We opted to only use the check-in date variable in the analysis contained in this report, since there appeared to be errors with the completion date variable.

- We used the check-out and check-in dates to represent the length of time it took for a Production and/or QC Enumerator to complete work on an AA binder. These dates represent the entire time the AA binder was out of the LCO, not just the time it took the Production and/or QC Enumerator to complete their work on it. Note it could take a day or more for an AA binder to be given to the Enumerator, then another day or more to return it to the LCO when the Enumerator was finished.

NPC DQC form files

- NPC staff received and captured only 199,981 (98.57 percent) unique DQC forms out of 202,890 AAs checked. Of the 199,981 DQC forms, only 191,881 (94.57 percent) DQC forms contained a captured pass or fail decision.

- NPC never received 42 AA binders, due to issues with tracking shipped AA binders between the LCO and NPC. Most likely the DQC forms for these 42 AA binders never arrived at NPC for data capture and are missing from our analysis.

- The length of the DQC form (one to seven pages in length) created difficulty in determining a data capture plan since NPC tracks forms by pages, not by form. Because there were multiple pages per form, NPC captured each DQC page separately. Three different files were created from each page and sent to HQ. It was often difficult to match the DQC forms back together due to missing data, repetitive data, and the two different level files. To complicate matters, although only one DQC form should have been completed for each AA, we received multiple DQC forms for AAs. In this situation, we chose to use the form containing the most captured fields.

- Since DQC results were captured in two different sources, we had the opportunity to compare the results captured on the forms with the results captured in PBOCS. Of the 199,226 AAs in common, 191,366 had the same results in both sources and 2,758 forms, or 1.44 percent, had differing results (either the PBOCS DQC file documented the AA passed and the NPC file documented it failed, or vice versa). When possible, we used the results from the PBOCS DQC file as fact since the data were more comprehensive.

- Due to missing and inaccurately keyed or recorded data, we were unable to use all AAs to determine the accuracy of the sampling plan and in the calculation of the Incoming Sample Error Rate and the Outgoing Error Rate.

C. Office Review

PBOCS DQC file

- The second Office Review results were not accurately captured in PBOCS and were excluded from our analysis.

- The first Office Review results could have been inaccurately captured in PBOCS as well, since typing the results into PBOCS was not monitored or checked for accuracy.

NPC Office Review Checklist File

- The LCOs were originally instructed to destroy the Office Review forms, instead of sending them to NPC, so LCOs may have mistakenly destroyed some of the Office Review Checklists.

- Some of the LCOs included the Office Review Checklists in the AA binder instead of removing them and shipping them separately. This created extra work at NPC, and it increased the likelihood that not all of the Office Review Checklists were data captured.

- HQ staff received 742 forms after data capture was complete. They are not included in the analysis.

- During the first Office Review, an AA binder was only reworked if its critical error rate exceeded five percent. Also, due to time and budget constraints, the AA binders were shipped to NPC even if they failed the second Office Review. As a result, some AA binders were shipped to NPC with unfixed errors from either the first or second Office Review.

- Due to the time constraints in developing procedures for a second Office Review, these results were captured on the same form as the first Office Review. As a

result, it was difficult to distinguish the first Office Review results from the second Office Review results.

V. Results

The 2010 U/L QC program consisted of three components: Initial Observations, DQC, and Office Review(s). In this section, we report on the results following our analysis of the collected data.

A. Initial Observation Results

The purpose of conducting the Initial Observation was to see how well Enumerators demonstrated their understanding of the U/L procedures. Since the results were captured, we can see not only how often Enumerators were observed, but also what the major stumbling blocks were in understanding U/L procedures. The analysis of these results can aid in planning future census operations.

In the end, we kept 23,817 Observation Checklists in our universe for analysis, or 88.93 percent of the 26,782 forms we received in the keyed files from NPC. Detailed below is a description of how we processed the Observation Checklist file we received from NPC to achieve the counts displayed in Table 5 followed by our findings from the data used in our analysis. The results provided answer the questions contained in the QC Plan, as well as a few additional questions. Refer to Table K1a – Table K1m for the results of Table 6 by RCC.

Table 5: Breakdown of Observation Checklists Removed from Analysis

Number of Observation Checklists received (file and hard copy):		27,062
Blank applicant ID:	1,280	
No type of observation indicated:	64	
Containing both Production and QC data:	436	
Production Enumerator exact* duplicates:	344	
QC Enumerator exact duplicates:	109	
Production Enumerator remaining duplicates:	635	
QC Enumerator remaining duplicates:	97	
Forms not keyed in NPC:	280	
Total number of forms removed:		3,245
Resulting number of forms analyzed:		**23,817**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ
*"Exact" duplicates contained the same information captured in all variable fields other than the notes field and the barcode label field, while "remaining" duplicates may have only matched on the applicant ID field.

At the close-out of data capture, NPC staff sent the Observation Checklist file to HQ staff. We reviewed the data contained in the file to ensure each record was unique. We had to ensure the file contained one and only one record, or Observation Checklist form, for each Enumerator based on the type of Enumerator, Production or QC. An Enumerator could work as a Production

Enumerator and a QC Enumerator, so it was possible there could legitimately be two Observation Checklists completed for the same Enumerator, and we allowed for this. We determined unique Observation Checklists based on the applicant ID number associated with each record on the NPC keyed data file. Of the 26,782 Observation Checklists keyed, 1,280 contained blank applicant IDs (or erroneous information in the applicant ID field[11]). Since we were unable to unduplicate the forms with blank applicant IDs from the forms with applicant IDs, we removed these forms from our analysis.

Of the 25,502 remaining Observation Checklists;

- 20,355 forms were completed for Production Enumerators,
- 4,647 forms were completed for QC Enumerators,
- 436 forms contained data for both Production and QC Enumerators, and
- 64 forms had no type of observation indicated.

Although it was possible for an Enumerator to work during Production and QC and a CL may have used the same form to conduct the observation, we still had to remove the 436 forms containing both types of data from our analysis. Each form contained only one checkbox to indicate the results of the observation, and we were unable to associate the results of the observation with the observation type, Production or QC. Eighty-two of the 436 forms had a type of observation code that did not match the tasks checked on the form (e.g., a form was marked as a Production form but the QC tasks were filled in), while the remaining 354 forms contained data for both the Production and QC tasks. We removed from our analysis the records keyed from 64 Observation Checklists with no type indicated, since the analysis is reliant on type of observation[12]. See Appendix J for more information on the forms removed from the analysis.

After dividing the forms by type of observation, we identified multiple forms with the same applicant ID. We first removed the exact duplicate forms from our data set. Exact duplicates were defined as forms with the same information captured in all of the variable fields other than the notes field and the barcode label field. We allowed for minor differences in the notes field since a 1,000 character field could easily have been keyed incorrectly. The barcode labels were unique for each form even if the information contained on the form was the same. Since they were created and placed on the forms after they arrived at NPC, we excluded the barcode label field in our definition of exact duplicates. We removed 344

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[11] We received a few forms with data keyed in the wrong fields. For instance, one form had the name of the Enumerator keyed in the applicant ID field. We were unable to resolve the keying errors without seeing the forms, so we removed these forms from our analysis.

[12] Most likely the forms with no type of observation and no data indicate the Enumerator quit after training and before completing any field work.

Production Enumerator Observation Checklists and 109 QC Enumerator Observation Checklists that were identified as exact duplicates.

Duplicate forms remained, even after removing the exact duplicates. After close examination, we identified possible reasons for some of the remaining duplicate forms. Table 5 documents possible explanations as to why we received multiple non-exact duplicate observation checklists and how we resolved the issues.

Table 6: Scenarios Explaining Duplicate Observation Checklists

Scenarios	Solution
CL filled out additional observation forms for the same Enumerator. CL filled out the additional observation information in the first observation fields of the additional forms.	Selected the two forms with the earliest and latest dates as the first and second observation. Copied the task data, observation name, number, and date from the second observation into the second observation portion of the first observation form. Used the results from the second observation as the final results of the observation.
CL filled out additional observation forms for the same Enumerator. CL filled out the additional observation information in the second observation fields of the additional forms.	Selected the two forms with the earliest and latest dates as the first and second observation. Copied the task data, observation name, number, and date from the second observation into the second observation portion of the first observation form. Used the results from the second observation as the final results of the observation.
CL filled out additional observation forms for the same Enumerator. CL filled out the observation information on the wrong side of the additional forms (Production observation filled out in the QC section or QC observation filled out in the Production section).	Removed these forms from our analysis, since we could not identify if the result applied to the Production or QC Enumerator work.
CL filled out one form for each unit observed.	Selected the form with the earliest date and the latest date and used the data from these two observations as the first and second observations. Used the results from the second observation as the final results of the observation.

In general, we combined the data from the second observation into the same record as the first observation under two conditions; we identified only two forms with the same applicant ID and the dates on the two forms were different. If a CL submitted more than two forms for an Enumerator, we kept the observation record with the earliest date as the first observation and the record with the latest date as the second observation.

After combining the forms with duplicate applicant IDs, even more duplicate records remained in the file. Since we could not identify why there were multiple forms, we selected the Observation Checklist with the latest date and removed the remaining duplicate forms from the universe. The remaining duplicates may be a result of keying errors or CLs misunderstanding Observation Checklist procedures. We deleted 979 Production Enumerator forms and 206 QC Enumerator forms either because they were duplicate forms or because they were missing required information.

1. **How many Enumerators (Production and QC) worked on U/L?**

   According to PBOCS, 42,321 Production Enumerators canvassed one or more AAs during U/L, and 9,643 QC Enumerators conducted DQC on at least one AA following Production canvassing. We limited our count of Enumerators to any Production or QC Enumerator who canvassed at least one AA. Note: There may be more Enumerators who quit before completing any field work.

   Production Enumerators were permitted to work as QC Enumerators after the Production phase was completed, but were not allowed to work an AA in QC they had previously worked in Production. Approximately 764 Production Enumerators also worked as QC Enumerators. Out of all 202,890 AAs, only one AA was canvassed and checked by the same Enumerator. Overall, 51,200 unique Enumerators worked during the U/L Operation. Refer to Table K2 and Table K4 in Appendix K for the count of Production and QC Enumerators who worked in each Regional Census Center (RCC)[13] during U/L.

2. **How many Enumerators (Production and QC) were observed?**

   After data cleaning, we received data from 23,817 Observation Checklists, of which 19,376 were Production Enumerator forms and 4,441 were QC Enumerator forms. Therefore, according to the observation forms captured at NPC, Production CLs observed at least 19,376 Production Enumerators and QC CLs observed at least 4,441 QC Enumerators.

   Given the number of Production and QC Enumerators listed in PBOCS, CLs across the U.S. and P.R. should have conducted 51,964 Initial Observations during U/L. This is the total number of unique Enumerators, 51,200, plus the 764 Production Enumerators who worked as QC Enumerators as well. Although 764 Enumerators worked during both the Production and QC phase of U/L, we believed a separate observation form would be used for each phase. Although it is possible the results of the

[13] In addition to the data reported in the Quality Profile, we provided appendices of our results broken down to the RCC level. We separated Puerto Rico (2102) from the Boston RCC (2199) in all of the RCC tables so that the Stateside results could easily be distinguished from the P.R. results.

QC observation could have been recorded using the same form as the Production observation, it is unlikely since the form only allowed for one observation result, and different CLs would have conducted the two observations.

According to our keying specifications, we required certain data fields to be completed on the Observation Checklist in order for the form to be eligible for keying. The only required field for the Observation Checklist for U/L was the LCO code. NPC was only supposed to key the data on the Observation Checklists containing an LCO code.

The number of Observation Checklists should have matched the number of Enumerators who worked during the U/L Operation. According to the coverage results in Table 7, we received an observation form for a little less than half (45.83 percent) of the Production and QC Enumerators. Refer to Table K3 in Appendix K for coverage results by RCC.

Table 7: Initial Observation Coverage*

	No. of Enumerators	No. of Observation Checklists Keyed	% of Observation Checklists Keyed
Production Enumerators	42,321	19,376	45.78
QC Enumerators	9,643	4,441	46.05
All Enumerators	**51,964**	**23,817**	**45.83**

Data Sources: PBOCS DQC file and NPC keyed data file of Update/Leave Initial Observation Forms
*Since we removed forms from the analysis, our coverage estimates may be low.

Even if we did not remove the duplicate forms and included the hard copies we received in our analysis, we still only would have received 52.08 percent of the anticipated Observation Checklists. Although we did not receive Observation Checklists for all of the Enumerators listed in PBOCS, we assume the majority, if not all, of the Enumerators were observed during the U/L Operation. Possible explanations for NPC keying only around half of the expected number of Observation Checklists include:

- The LCOs failed to ship all of the Observation Checklists to NPC.
- The LCOs collected the U/L observation data on the wrong Observation Checklist forms, since multiple operations used different versions of the Observation Checklists.
- The missing Observation Checklists were lost during shipping.
- NPC staff keyed only some of the Observation Checklists they received due to missing data in the LCO field.

Based on the possible explanations stated above, for future census tests and operations we need to develop a better system and procedures for completing and tracking Observation Checklists.

The CLs had the option to observe an Enumerator a second time if he or she felt the Enumerator would benefit from retraining. Of the 19,376 Production Enumerator forms, 92.90 percent of the Production Enumerators received only a first observation, and 94.71 percent of the 4,441 QC Enumerators received only a first observation. Table 8 provides the breakdown of the Observation Checklists by type of Enumerator and number of observation.

Table 8: Breakdown of Initial Observation Forms

	Production		QC	
Observation	**Count**	**Percent**	**Count**	**Percent**
1st	18,000	92.90	4,206	94.71
2nd	1,376	7.10	235	5.29
Both	**19,376**	**100.00**	**4,441**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

Refer to Table K5 and Table K6 located in Appendix K for the count of first and second observations for Production and QC Enumerators by RCC.

3. **What was the final outcome of the Initial Observation for both Production and QC?**

The CL determined whether the Enumerator's work was satisfactory or unsatisfactory. The CL was instructed to mark the results checkbox in Section C of the Observation Checklist (see Appendix B or C) based on the first observation, when he or she conducted only a first observation. If the CL conducted a second observation, he or she marked the checkbox with the results of only the second observation. Therefore, if an Observation Checklist contained any data for a second observation, we assumed the results reported indicated the results of the second observation. If the Enumerator quit or was unable to be observed in the field, the "other" box was checked in Section C.

Production Enumerators

The majority (97.17 percent) of the observed Production Enumerators demonstrated a good overall understanding of U/L procedures, and therefore had a satisfactory Initial Observation. Table 9 provides

additional results of the Initial Observations for Production Enumerators by observation number.

Table 9: Results of the Initial Observation(s) for Production Enumerators

	1st Observation		2nd Observation		All Enumerators	
Results	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Satisfactory	13,508	90.56	986	6.61	14,494	97.17
Unsatisfactory	187	1.25	54	0.36	241	1.62
Other	172	1.15	9	0.06	181	1.21
Total*	**13,867**	**92.97**	**1,049**	**7.03**	**14,916**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*There were 4,460 Production Enumerator observation forms excluded due to missing Observation Results information.

Ninety-one percent of the Production Enumerators passed their first observation, with another 6.61 percent passing their second observation. About three percent of the Production Enumerators either failed during the first or second observation or quit before the observation was complete.

Of the 19,376 Production Enumerator Observation Checklists, only 14,916, or 76.98 percent, of the forms had one of the three results boxes checked. We could not decipher if the forms were missing results because they were submitted without a marked checkbox or if the results were missed during data capture. Unfortunately, we did not require NPC staff to key an indicator for when a response was blank[14]. Regardless of the reason, we cannot draw any conclusions about the overall results of the forms without a marked checkbox, so we excluded the 4,460 Production Enumerator Observation Checklists with blank results from our analysis.

Quality Control Enumerators

Similar to the Production Enumerators, the vast majority of the QC Enumerators with observation results, 98.21 percent, passed the Initial Observation. Ninety-three percent of the QC Enumerators passed their first observation, with another five percent passing their second observation. The remaining QC Enumerators (1.80 percent) either failed during the first or second observation or quit before the observation was complete. Nearly ten percent of the QC Enumerator Observation Checklists did not contain results. Therefore, we removed 423 of the 4,441 QC Enumerator Observation Checklists from our analysis. See Table 10 below for additional information on the first and second Initial Observations for QC Enumerators.

[14] In the future, a better way for NPC to key the results is to require a value for every box captured, even if it is blank. For instance, if there was no observation result indicated, NPC could have keyed a "9," so we could better interpret the results.

Table 10: Results of the Initial Observation(s) for Quality Control Enumerators

	1st Observation		2nd Observation		Both	
Results	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Satisfactory	3,736	92.98	210	5.23	3,946	98.21
Unsatisfactory	31	0.77	7	0.17	38	0.95
Other	34	0.85	0	0.00	34	0.85
Total*	**3,801**	**94.60**	**217**	**5.40**	**4,018**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*There were 423 QC Enumerator observation forms excluded due to missing Observation Results information.

Although we do not have data for all of the observations conducted during U/L, based on the data we received, we can conclude the majority of the Enumerators succeeded in having a satisfactory first observation (17,668 out of 18,934 or 93.31 percent). Overall, the great majority of Enumerators, 97.39 percent, including those requiring a second observation, passed the observation; and therefore, left training with a good understanding of the U/L procedures.

Tables K7 through K12 in Appendix K contain Initial Observation results for Production and QC Enumerators by RCC.

4. **What is the distribution of errors committed by the Production Enumerator during the Initial Observation?**

Although we removed forms with missing results to report on the outcome of the observation, we included all of the 19,376 Production Enumerator Observation Checklists in this error analysis in order to report on all of the errors captured. Even though the outcome of the observation may have been missing, the observed errors were often times still captured on the form.

The CLs observed the Production Enumerators for either two hours or for ten addresses, whichever came first. The CL evaluated them on potentially 20 tasks that were part of their job. The Production Enumerator tasks consisted of checks of basic canvassing procedures, completing the Address Listing Page, completing the Add Page, and updating the Block Maps. All of these tasks were explained in detail during the U/L Production Enumerator training sessions prior to the observation. The CL marked the checkbox for each task with a "Y" (Yes), "N" (No), or "N/A" (Not Applicable) depending on whether he or she observed the task and if it was performed correctly.

- "Y" - indicated the CL observed the task during the observation and it was performed correctly.

- "N" - indicated the CL observed the task during the observation and it was not performed correctly.

- "N/A" - indicated the CL did not observe the task during the observation.

The gray boxes on the form indicated tasks that the CL must observe. See Appendix B and Appendix C for a full listing of tasks on the Production Enumerator Observation Checklists for both the U.S. and P.R.
Table 11 provides a summary of the errors documented during the Production Enumerators' observations.

Table 11: Number of Production Enumerator Errors Committed During Observations

Production Enumerator Observation Tasks	1st Observation	2nd Observation
1. Canvassed in correct block	282	26
2. Checked for living quarters at every structure on the right while canvassing a block	265	31
3. Interviewed or attempted to interview someone at every structure, including commercial and nonresidential addresses	168	18
4. Contacted or attempted to contact building manager, superintendent, or other knowledgeable person at each multi-unit structure	317	28
5. Showed Census identification and provided a copy of the D-31, Confidentiality Notice, to each respondent	444	20
6. Entered the correct Action Code in Column (5a) for each address on the Address Listing Page	536	47
7. Entered the correct line number (from Column (1)) in Column (5b) of the Address Listing Page for listings assigned the D2 Action Code	331	33
8. For living quarters missing map spot numbers in Column (4) of the Address Listing Page, correctly added a map spot and map spot number to the Block Map and added the map spot number in Column (4)	420	47
9. Added available but missing house numbers in Column (6a) of the Address Listing Page	219	24
10. Make appropriate updates in Columns (6b), (6c), (6d), (7a), and 8 of the Address Listing Page for all addresses	293	38
11. Entered a location description in Column (8) of the Address Listing Page for housing units without a house number	275	25
12. Correctly added missing living quarters to the appropriate Update/Leave Add Page	276	27
13. Verified that the living quarter's map spot and block number on the Block Map matched the living quarter's map spot and block number on the Address Listing Page	437	43
14. Verified or corrected the map spot location for all living quarters on the Block Map	389	39
15. Correctly added or deleted map spots on the Block Map	443	51
16. Correctly made updates to street features on the Block Map	318	29
17. Verified that the geographic codes on the preaddressed questionnaire address label matched the Address Listing Page	467	34
18. For added housing units, correctly copied the Processing ID from the questionnaire address label to Column (3) of the Update/Leave Add Page for Housing Units	394	32
19. Corrected the housing unit's address on the preaddressed questionnaire label to reflect changes made to the housing unit's address on the Address Listing Page	355	30
20. Entered D1, D2, E, N, or U on the preaddressed questionnaire label for each undeliverable questionnaire	239	21

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

* The errors will not sum to the total of Production Enumerator observation forms. This table includes the forms excluded from the results table.

The most common error committed by the Production Enumerator was task 6, "Entered the correct Action Code in Column (5a) for each address on the Address Listing Page," with 583 Production Enumerators committing that error during either their first or second observation. The three most common errors committed during a Production Enumerator's first observation were as follows.

- Failed to enter the correct action code for each address in the Address Listing Page (Task 6).
- Failed to verify the geographical codes on the preaddressed label matched the Address Listing Page (Task 17).
- Failed to show Census identification and provide a Confidentiality Notice to each respondent (Task 5).

The three most common errors committed during a Production Enumerator's second observation were as follows.

- Failed to add or delete map spot on Block Map (Task 15).
- Failed to enter the correct action code for each address in the Address Listing Page (Task 6).
- Failed to add missing map spot numbers (Task 8).

For Production Enumerator error results by RCC, see Table K13 and Table K14 in Appendix K.

5. **What is the distribution of errors committed by the QC Enumerator during the Initial Observation?**

We used all 4,441 QC Enumerator Observation Checklists with task boxes checked in our error results. Similar to the Production Enumerators, the QC CLs observed the QC Enumerators canvassing and evaluated them on how well they completed 20 tasks. The QC Enumerator observations differed from the Production Enumerator observations because the QC CL observed him or her canvass a varying number of units, depending on the size of the DQC sample, instead of observing for two hours or for ten addresses. The QC Enumerator tasks included canvassing procedures and accuracy in completing the DQC form, the Address Listing Page, and the Add Page, as well as correctly map spotting on the Block Maps. See Appendix D and Appendix E for a full list of tasks on the QC Enumerator Observation Checklists for both the U.S. and P.R. Table 12 provides a summary of the errors documented during the QC Enumerator's observations.

Table 12: Number of QC Enumerator Errors Committed During Observations

Task QC Enumerator failed to perform or perform correctly	1st Observation	2nd Observation
1. Filled Items (1), (2), (3), and (4) of the Dependent Quality Control form correctly, when necessary	75	5
2. Marked the appropriate error items on the Dependent Quality Control form	53	5
3. Correctly totaled the errors (Items 16 and 17) on the Dependents Quality Control form	32	3
4. Correctly determined pass/fail results (Item 18) on the Dependent Quality Control form	24	3
5. Worked in the correct block	35	8
6. Checked for living quarters at every structure on the right while canvassing a block	41	6
7. Interviewed or attempted to interview someone at every structure, including commercial and nonresidential addresses	29	5
8. Contacted or attempted to contact building manager, superintendent, or other knowledgeable person at each multi-unit structure	51	5
9. Showed Census identification and provided a copy of the D-31, Confidentiality Notice, to each respondent	89	4
10. Entered the correct line number (from Column (1)) in Column (5b) of the Address Listing Page for listings assigned the D2 Action Code	47	3
11. For living quarters missing map spot numbers in Column (4) of the Address Listing Page, correctly added a map spot and map spot number to the Block Map and added the map spot number in Column (4)	48	6
12. Added available but missing house numbers in Column (6a) of the Address Listing Page	36	1
13. Made appropriate updates in Columns (6b), (6c), (6d), (7a), and 8 of the Address Listing Page for all addresses	31	4
14. Entered a location description in Column (8) of the Address Listing Page for housing units without a house number	24	2
15. Correctly added missing living quarters to the appropriate Update/Leave Add Page	33	2
16. Verified that the living quarter's map spot and block number on the Block Map matched the living quarter's map spot and block number on the Address Listing Page	53	9
17. Verified or corrected the map spot location for all living quarters on the Block Map	46	6
18. Correctly added or deleted map spots, when necessary	50	5
19. Correctly made updates to the street features on the Block Map	57	6
20. For added housing units, correctly copied the Processing ID from the questionnaire address label to Column (3) of the Update/Leave Add Page for Housing Units	30	2

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

***** The errors will not sum to the total of QC Enumerator observation forms. This table includes the forms excluded from the results table.

The most common error of the QC Enumerators and observed by the CL was failure to show Census ID and provide a copy of the Confidentiality

Notice to each respondent, with 93 QC Enumerators committing this error during either their first or second observation.

The two most common errors committed during a QC Enumerator's first observation were as follows:

- Failed to show Census ID and provide a Confidentiality Notice to each respondent (Task 9).

- Failed to fill in items (1), (2), (3), and (4) on the DQC form when necessary (Task 1).

The two most common errors a QC Enumerator failed to do during his or her second observation were as follows:

- Failed to verify that the living quarter's map spot and block number on the Block Map matched the living quarter's map spot and block number on the Address Listing Page (Task 16).

- Failed to work in the correct block (Task 5).

See Table K15 and Table K16 in Appendix K for a breakdown of the observation errors committed by QC Enumerators in each RCC.

6. **How many Enumerators (Production and QC) failed the first Initial Observation (did not receive a 2nd Initial Observation)? Of these, what final employee status did the Enumerator have?**

If an Enumerator failed or had an "Unsatisfactory" first Initial Observation, there were two possible outcomes for the Enumerator; retraining or termination. If the CL's supervisor determined the Enumerator was capable of learning the U/L procedures, he or she instructed the CL to retrain the Enumerator and conduct a second observation. Otherwise, the CL terminated the Enumerator.

Of the 14,916 Production Enumerator Observation Checklists with results, 187 Production Enumerators failed the first observation and did not receive a second observation. Of the 4,018 QC Enumerator Observation Checklists, 31 failed the first observation and did not receive a second observation.

DAPPS contained the final employee status for each enumerator who worked during U/L Operation. All of the Enumerators were eventually terminated at the end of the U/L Operation as their U/L work ended. The data file we received from DAPPS only included the dates Production and QC Enumerators were terminated during the U/L Operation time frame.

Since the operation lasted around a month and because capturing the termination in the DAPPS system was most likely not an immediate process due to paper-work (unlikely the same day as a failed observation), we allowed one week between the observation and termination. Although DAPPS had the last day Enumerators worked in the field, either in production or QC, it lacked the information as to why the enumerator was terminated. This information could have been used to determine if Enumerators were terminated due to an unsatisfactory result based on the CL's observation of that enumerator's work, or just quit their job.

A total of 187 Production Enumerators had an unsatisfactory first observation. Eighty-two of these 187 enumerators were missing from the DAPPS data file. We speculate that these Enumerators were retrained or continued to complete field work even with an unsatisfactory observation[15]. An additional 79 production Enumerators were either terminated over a week after the Initial Observation or we received an Observation Checklist with missing data so we were unable to draw any conclusions. This left only 26 of these 187 production Enumerators, or 13.90 percent, who were terminated within one week of the observation date.

As for the 31 QC Enumerators who had an unsatisfactory first observation, 15 were missing from DAPPS. Eleven were terminated over a week from the latest observation date, and five were terminated within one week of his/her observation. Therefore, 16.13 percent of the QC Enumerators who failed their first Initial Observation were terminated within one week of their observation date. Table 13 summarizes the final employee statuses for both Production and QC Enumerators who failed their first observation and were not observed a second time.

Table 13: Final Employee Status for Enumerators who Failed 1st Observation with no 2nd Observation

	Production Enumerators		QC Enumerators	
Final Employee Status	Count	Percent	Count	Percent
Retrained/Missing from DAPPS	82	43.85	15	48.39
Missing Date	4	2.14	0	0.00
Terminated (more than a week)	75	40.11	11	35.48
Terminated (less than a week)	26	13.90	5	16.13
All Enumerators Failed 1st observation:	**187**	**100.00**	**31**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and DAPPS data

[15] Another possibility is the Enumerators may not have been missing from the DAPPS file, but instead the applicant ID may have been typed incorrectly.

We expected that a higher percentage of Enumerators who failed the first Initial Observation without being retrained would have been immediately terminated. Explanation for these unexpected results includes the following:

- Staff in the LCO or at NPC keyed the data incorrectly.
- The CL conducted a second observation, but we did not receive the data from the second Observation Checklist, or we only received data from the second observation in the incorrect observation column.
- The CLs did not follow the instructions for the Initial Observation and allowed Enumerators with an "Unsatisfactory" observation to continue field work.
- There are flaws in the assumptions we made analyzing the data.

7. **How many were retrained as a result of failing Initial Observation?**

Instead of immediate termination, a CL may have opted to retrain and observe a second time an Enumerator with an unsatisfactory first Initial Observation. Since the CLs were only able to capture the results of one observation, we concluded Enumerators who were observed a second time failed the first observation. According to the Observation Checklist data captured at NPC, about 85 percent or 1,049 of the Production Enumerators were retrained by way of a second observation. Two hundred seventeen, or 87.50 percent of the QC Enumerators were retrained by way of a second observation. Of the Production Enumerators who received a second observation, 986 (93.99 percent) received satisfactory results after completing a second observation, and 210 QC Enumerators, or 96.77 percent, received satisfactory results the second time around.

According to the data captured in DAPPS, CLs terminated 18 of the 1,049 Production Enumerators with a second observation and five of the 217 QC Enumerators. Although we reported 54 Production Enumerators failed the second observation, only 18 were terminated within one week following the observation.

CLs terminated five QC Enumerators within one week of their second observation while we reported only seven with an unsatisfactory second observation based on the keyed observation forms. See Table 14 for more results on the final employee statuses of the Enumerators.

Table 14: Final Employee Status for Enumerators who Failed 2nd Observation

	Production Enumerators		QC Enumerators	
Final Employee Status	Count	Percent	Count	Percent
Retrained/Missing from DAPPS	870	82.94	181	83.41
Missing Date	2	0.19	0	0.00
Terminated (more than a week)	159	15.16	31	14.29
Terminated (less than a week)	18	1.72	5	2.30
All Enumerators failed 2nd Observation:	**1,049**	**100.00**	**217**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and DAPPS data

If an Enumerator received an "Unsatisfactory" observation, the CL was instructed to write an explanation in the notes field why the Enumerator received this result. In addition to reporting on the Enumerators who failed the first observation, we documented how often notes were not written with an unsatisfactory observation. The CL wrote notes in the majority (75.93 percent) of forms of the Enumerators who were terminated, 41 Enumerators out of 54. See Table 15 for the distribution of the final employee status for the Production Enumerators who failed his/her first Initial Observation, as well as the frequency of the CL writing notes.

Table 15: Final Employee Status for Production Enumerators who Failed Initial Observation

	Notes		No Notes		All	
Final Employee Status	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Retrained/Missing from DAPPS	325	34.14	627	65.86	**952**	**100.00**
Missing Date/Error	3	50.00	3	50.00	**6**	**100.00**
Terminated (more than a week)	140	59.83	94	40.17	**234**	**100.00**
Terminated (less than a week)	33	75.00	11	25.00	**44**	**100.00**
All Production Enumerators	**501**	**40.53**	**735**	**59.47**	**1,236**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and DAPPS data

See Table 16 for the distribution of the final employee status for QC Enumerators who failed his/her first Initial Observation, as well as the frequency of notes.

Table 16: Final Employee Status for QC Enumerators who Failed Initial Observation

	Notes		No Notes		All	
Final Employee Status	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Retrained/Missing from DAPPS	78	39.80	118	60.20	**196**	**100.00**
Terminated (more than a week)	27	64.29	15	35.71	**42**	**100.00**
Terminated (less than a week)	8	80.00	2	20.00	**10**	**100.00**
All Production Enumerators	**113**	**45.56**	**135**	**54.44**	**248**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and DAPPS data

Additional Initial Observation Results

In addition to answering the questions provided in the QC Plan, this report contains additional Initial Observation results about the number of observed addresses obtained from the NPC keyed data file. We only used observation forms with fewer than 100 observed addresses in this analysis. We assumed an observation of 100 or more units indicated a keying error or a misunderstanding of the procedures and should not be included in this analysis.

The Production CL was instructed to observe an Enumerator list ten or more addresses or list for two hours, whichever came first. We assumed if a Production CL observed fewer than ten addresses, he or she observed the Enumerator for two or more hours. The QC CL was instructed to observe the QC Enumerator verify the DQC sample for one AA. As illustrated in Table 17, Production CLs observed ten or more addresses 59.66 percent of the time during the first observation and 47.03 percent of the time during the second observation. Most of the QC CLs observed fewer than ten addresses during both the first and second observations (88.77 percent and 75.25 percent respectively). We expected these results for the QC Enumerator since the predicted average AA size was 65, which would mean five HUs were checked during the DQC.

Table 17: Number of Addresses Observed by Type of Observation

	Production Enumerators		QC Enumerators	
Number of addresses observed	1st	2nd	1st	2nd
Observed less than 10 addresses	7,284	642	3,652	149
(observed for 2 hours)	(40.34%)	(52.97%)	(88.77%)	(75.25%)
Observed 10 or more addresses	10,772	570	462	49
	(59.66%)	(47.03%)	(11.23%)	(24.75%)
Total*	**18,056**	**1,212**	**4,114**	**198**
	(100.00%)	**(100.00%)**	**(100.00%)**	**(100.00%)**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

*The maximum number of addresses observed was limited to 100.

Refer to Table K17 and Table K18 in Appendix K for the count of addresses observed for each RCC.

In addition to the number of addresses observed, we looked at the average number of addresses worked during each observation. Although Table 17 shows that the majority of the CLs observed ten or more addresses, on average, the Production Enumerator worked between nine and ten addresses during both the first and second observation. The QC Enumerators worked on average five addresses during the first observation and eight units during the second observation. We anticipated the average DQC sample size would be around five addesses, and so the average number of units observed during QC observation falls right in line with expectations. See Tables 18 and 19 for more summary statistics.

Table 18: Summary Statistics from Production Enumerator Forms by Observation Number

	Number of Forms*	Average Number of Addresses Worked	Standard Deviation	Minimum
1st Observation	18,056	9.67	5.88	0
2nd Observation	1,212	9.70	8.81	0

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*The maximum number of addresses observed was limited to less than 100.

Table 19: Summary Statistics from QC Enumerator Forms by Observation Number

	Number of Forms*	Average Number of Addresses Worked	Standard Deviation	Minimum
1st Observation	4,114	5.42	5.53	0
2nd Observation	198	7.81	8.27	1

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*The maximum number of addresses observed was limited to less than 100.

Table K19 through Table K22 in Appendix K contain observation number statistics for each RCC.

B. Dependent Quality Control Check Results

One of the primary goals of the 2010 U/L Operation was to update the address list for all of the HUs within the U/L TEAs, for use in future census operations. In order to verify the accuracy of the Address Listing Pages and Add Pages, a QC Enumerator conducted a quality check on a sample of the HUs in each AA, termed the Dependent Quality Control check or the DQC. If errors were found, the QC Enumerator rectified the address information. If the QC Enumerator

found too many errors in the DQC sample, he or she recanvassed the remainder of the AA.

We received data for a total of 199,981 unique DQC forms in the NPC DQC forms, and for 202,890 AAs recorded in PBOCS. Detailed below is a description of how we processed the DQC form file we received from NPC and the results of the data collected during the DQC. The results provided answer the questions contained in the QC Plan using the PBOCS DQC file, when applicable, and the NPC DQC form files.

NPC staff keyed the DQC forms after all work was completed on an AA binder in the LCO and shipped them to NPC. We expected to receive data for one DQC form per AA; however, the NPC DQC form files contained data for duplicate DQC forms. Several explanations as to why multiple DQC forms may have been completed for an AA include the following:

- An Enumerator, CL or office clerk in the LCO could have misplaced an AA binder and reprinted and reworked the AA, when in reality the AA binder was already shipped to NPC. As a result, the LCO may have submitted multiple AA binders to NPC for data capture, and therefore, multiple DQC forms.

- Some of the AAs were too large to fit all of the paper work in one AA binder, and so the listing pages were split between two or more AA binders. The LCO staff may have incorrectly completed multiple DQC forms for the same AA.

- LCO staff or NPC staff may have photocopied the DQC forms and submitted both the original and the duplicate forms for keying.

- Keying errors or sloppy handwriting may have resulted in incorrectly keyed information in the AA number and LCO code field, creating the appearance of duplicate forms.

- Although the DQC forms were generated and printed in the LCO with information specific to the AA, an office clerk may have inadvertently used the same DQC form for multiple AAs.

Although we received data for 199,981 DQC forms, we only received results information for 193,146 DQC forms, of which 1,265 did not contain a DQC final result. Possible explanations for the difference in number of forms captured at NPC and in PBOCS include the following:

- The DQC forms may have been misplaced in the LCO and never shipped[16].

- The forms may have been misplaced after arriving at NPC.

- Approximately 42 DQC forms may have never made it to NPC for data capture. We were unable to adequately test the shipping application in PBOCS, and NPC did not receive these 42 AA binders from all of the LCOs. Since the DQC forms were stored inside the AA binders, the DQC forms may have never made it to NPC.

1. **How many Enumerators worked on U/L?**

   As discussed in Section A of the Results, we used the PBOCS DQC file as the official count of Enumerators who worked during the U/L field operation. During the Production phase of the U/L Operation, 42,321 Enumerators canvassed one or more of the 202,890 AAs. After the initial canvass, 9,643 QC Enumerators verified the listings by conducting DQC and, when necessary, recanvassing the AAs. Of the 42,321 Production Enumerators, 764 also worked as QC Enumerators after they completed their assigned Production work. A total of 51,964 Enumerators, or 51,200 unique Enumerators, worked during the U/L Operation. Refer to Table K1 and Table K2 in Appendix K for the count of Production and QC Enumerators who worked during U/L in each RCC.

2. **How many Enumerators were checked through the DQC?**

   CLs instructed QC Enumerators to check every AA during the DQC field operation. The work of every Production Enumerator who canvassed at least one AA during U/L Production should have been checked through the DQC. Since we used the PBOCS DQC file as our official count of Enumerators, and since all AAs were checked through DQC, we assumed all 42,321 Production Enumerators in PBOCS were checked through the DQC.

   NPC staff received and keyed 199,981 unique DQC forms completed by a total of 14,218 QC Enumerators. According to the pre-printed Production Enumerator applicant IDs captured from the DQC forms, 43,232 Production Enumerators were checked through the DQC. The NPC data showed 1,138 of the QC Enumerators previously worked as Production Enumerators, but moved to QC once Production was completed in the field.

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[16] For instance, NPC did not capture 98.68 percent (1,119) of the DQC forms from one LCO. NPC captured at least 80 percent of the DQC forms from all other LCOs.

Even though we did not receive a DQC form for each AA worked during the U/L Operation, the count of Production Enumerators was higher in the NPC DQC form file. We expected the Production Enumerator counts to be the same (or close), since the Production Enumerator applicant ID stored in PBOCS was printed on the DQC form[17]. Possible explanations as to why the NPC DQC file data contained a greater number of unique Enumerators include the following:

- The 11-digit applicant ID would be easy to mistype, and it is possible that the clerks at NPC mistyped several of the applicant IDs generating additional incorrect applicant IDs in the NPC keyed data file.

- The DQC field work could have been reassigned to a different Enumerator after the form was generated and hand annotated on the DQC form, and the Production Enumerator applicant ID may appear on the form in error.

- Although PBOCS indicates that each Production Enumerator worked at least one AA, it is possible that multiple applicant IDs could be stored in PBOCS for one AA. Perhaps it is possible for the applicant ID stored in the Production Enumerator applicant ID field and the applicant ID printed on the DQC form to be different. For instance, the Production Enumerator applicant ID in the PBOCS DQC file could be the first Enumerator assigned to work on an AA, while the Production Enumerator applicant ID printed on the DQC form could be the last Enumerator assigned to work on the same AA.

Unfortunately, due to limited testing of the DQC form generation in PBOCS, we are unsure why the count of Production Enumerator applicant IDs printed on the DQC forms does not match the count keyed from the forms in NPC. See Table 20 to see a comparison of the count of Enumerators in the PBOCS DQC file and in the NPC DQC form file.

[17] It is not surprising to find the unique QC Enumerator count in the NPC DQC file to be larger than the count in the PBOCS DQC file because the QC Enumerator applicant ID is hand-written on the form, increasing the possibility of error in data capture.

Table 20: Comparison of Production and QC Enumerator Counts by Data Source

Type of Enumerator	PBOCS DQC File	NPC Keyed Data File
Production Enumerators	42,321	43,232
QC Enumerators	9,643	14,218
Worked Both Production and QC	764	1,138
All Enumerators*	**51,964**	**57,450**

Data Source: PBOCS DQC file and NPC keyed data file of the DQC Forms

* The Enumerators who worked as both Production and QC Enumerators are only counted once in the total number of Enumerators, therefore, the columns do not sum to the totals.

Refer to Table L1 in Appendix L for the count of Production and QC Enumerators who worked in each RCC.

3. **How many total units were listed for U/L?**

Based on the original enumeration file, the universe used to populate the Address Listing Pages, the expected Production workload for U/L was 11,982,126 HUs, 10,399,379 for the U.S. and 1,582,747 for P.R., excluding the HUs added during canvassing. According to the DMD cost model, the estimated U/L Production workload was 12,830,371 HUs, with units added during canvassing factored in.

Unfortunately, we cannot accurately estimate the number of HUs listed for U/L using either the PBOCS DQC file or the NPC keyed DQC form file. Both of the data sources exclude the count of the HUs added during the DQC and/or recanvassing. Even taking that into consideration, there are still flaws in our files that prevent an accurate calculation of the HUs worked during U/L. Below are the estimates of HUs listed in U/L prior to the DQC using the data supplied by PBOCS and NPC.

- PBOCS DQC file count: 13,873,056 HUs

  We approximated this number based on the number of lines contained on the Address Listing Pages in the AA binders prior to DQC. The PBOCS DQC file only contained a count of the lines filled in each AA binder, instead of the number of HUs listed in each AA. A line in the AA binder not only represented every unit canvassed during the Production phase of U/L, but also blocks with zero units. As a result, each zero block was treated similarly to a unit in order for each block to have a possibility of being selected as the starting unit for the DQC. In addition, OLQs and nonresidential units that were out of scope for the U/L Operation were also included as individual lines. Since this number represents the number of lines filled on a set of Address Listing pages for an AA, it is most likely an overestimate of the number of units in the AA prior to DQC.

- NPC DQC form file count: 65,931,301 HUs

  Although we did not receive data from NPC for all AAs canvassed during U/L, our estimated HU count is an overestimate of the HUs listed or verified during the Production phase of U/L due to keying errors within the NPC DQC form data. Several of the DQC forms HU counts were actually the applicant ID (up to an eleven digit number) keyed in the wrong field.

- Adjusted NPC DQC form file count: 12,063,546 HUs

  In order to obtain a better estimate of the HU counts captured from the DQC forms, all forms with over 5,143 HUs were removed. The largest AA size recorded in the PBOCS DQC file was 5,143, so anything captured in NPC should have been less than this value.

- Combination PBOCS and NPC file count: 12,646,746 HUs

  In order to get the best estimate possible, we used the NPC DQC form AA size when provided and less than 2,000 HUs, and supplemented the missing DQC forms with the AA line numbers recorded in PBOCS. For the remainder of this report, we used the combination count as our best estimation of the number of HUs worked in all AAs during U/L, using the PBOCS and NPC DQC files.

NPC keyers captured the address information from the Address Listing Pages and Add Pages contained in the AA binders, in addition to capturing the data on the Observation Checklist, DQC, and Office Review Checklists. At the end of the U/L Operation, 12,521,989 HUs were listed on the Address Listing Pages and Add Pages keyed from the AA binders. This value represents the actual count of HUs worked during the U/L Operation. Table 21 summarizes the difference in HU counts before and after the U/L Operation.

Table 21: HU Counts by Data Source

Data Source	HU Count
HU Count prior to U/L	
Estimated Workload	12,830,371
Count Prior to DQC	
PBOCS	13,873,056
NPC*	65,931,301
Adjusted NPC†	12,063,546
Combination PBOCS and NPC	12,646,746
Count After the DQC	
MAF	12,521,989

*This value is an overestimate of the HU count due to DQC form keying errors.
† All AAs with over 5,143 HUs were removed in an attempt to remove keying errors, since this was the largest AA size recorded in PBOCS. In future analysis, the adjusted NPC HU count was used in place of the NPC DQC form file HU count.

Table L2 in Appendix L provides the total number of units worked during U/L by each data source in each RCC.

4. **How many units were checked through the DQC (in total)? What percent of total?**

According to PBOCS DQC file, the QC Enumerators checked 996,476 HUs during the DQC. This accounted for 7.88 percent of the total U/L workload. If an AA failed DQC, the QC Enumerator immediately recanvassed any additional HUs in the AA. According to the NPC DQC file supplemented with the PBOCS DQC file (the combination file), QC Enumerators recanvassed 836,349 HUs. We determined the number of HUs recanvassed by selecting only the AAs that failed DQC and subtracting the sample size from each AA size. The recanvassing workload values are approximations of the recanvassing workload because of issues previously discussed with the AA size variables.

The total workload of all of the HUs worked during one of the QC phases was 1,832,825 HUs according to the combination file, or 14.49 percent of the total U/L workload. Refer to Table 22 for a distribution of the QC workload in comparison to the total U/L workload by each data source.

Table 22: QC Workload by Data Source

	PBOCS		Adjusted NPC[‡]		Combination[§]	
	Count	**Percent**	**Count**	**Percent**	**Count**	**Percent**
DQC	996,476	7.18	956,800	7.93	996,476	7.88
Recanvass	930,213	6.71	883,226	7.32	836,349	6.61
Other*	11,946,367	86.11	10,223,520	84.75	10,813,921	85.51
All Units[†]	**13,873,056**	**100.00**	**12,063,546**	**100.00**	**12,646,746**	**100.00**

Data Source: PBOCS DQC file and NPC keyed data file of the DQC Forms
*"Other" represents the number of HUs worked during the Production phase of the U/L Operation only.
[†]"All units" represents the number of HUs listed in the AA binders.
[‡] All AAs with over 5,143 HUs were removed. This was done in an attempt to remove the keying errors.
[§]The combination file contains AA sizes from the NPC file for most AAs, and the PBOCS DQC file for the remaining AAs.

Refer to Table L3 and Table L4 in Appendix L for the number of HUs checked through each phase of the QC portion of the U/L field operation in each RCC.

5. **How does this compare to our budget/plan?**

The budgeted QC workload was an overestimate of the actual workload, mainly because some of the HUs were counted twice and the estimated DQC failure rate was overestimated (the actual DQC failure rate was nearly four percent less than assumed for initial budgeting purposes). Since the QC workload was 81.17 percent of what was estimated, even with the inaccuracies inherent in the data from both the PBOCS DQC file and the NPC DQC form file, the QC workload of around 1,832,825 HUs was under budget.

For the 2010 Census, the QC field workload was made up of the sample HUs worked during the DQC and the HUs worked during recanvassing. The DQC sample size was determined by the budget set for the QC field work. The following assumptions were used to calculate the estimated QC workload.

- Five percent of the Production workload was to be checked during DQC.
- The DQC failure rate would be around ten percent, based on the findings from the Address Canvassing Operation.
- The average AA size would be around 65 HUs.

Table 23 displays the steps taken to calculate the estimated QC workload, as well as the actual counts from the U/L field operation.

Table 23: Steps to Calculate the QC Workload

Steps	Description	Expected	Actual	Units
Determine the U/L Production workload	The Production workload was the sum of the number of HUs listed in the U/L enumeration areas determined from previous census operations and the number of expected added HUs.	12,830,371	12,646,746 *PBOCS &NPC*	HUs
Determine the average AA size	Field Division determined an average AA size for the U/L Operation.	65	62 *PBOCS &NPC*	HUs
Determine the number of AAs	After determining the average AA size, the units were divided into AAs averaging around 65 HUs.	202,890	202,890 *PBOCS*	AAs
Determine the DQC sampling rate	For the purposes of estimating the QC workload, the average AA size was used to calculate the sampling rate. If an AA had 65 HUs, five were checked during DQC, or about 7.60 percent of the HUs were checked during DQC.	7.60	7.88 *PBOCS & NPC*	%
Determine the DQC failure rate	Using the results recorded from Census 2000, the 2004 Census test and the Address Canvassing operation in 2010, we roughly estimated an AA failure rate.	10.00	6.03 *PBOCS*	%
Determine the number of HUs sampled during DQC	Using the Production workload estimate and the DQC sampling rate for an average sized AA, calculate the number of HUs worked during DQC. *Calculation:* Production workload x DQC sampling rate	975,108	996,476 *PBOCS &NPC*	HUs
Determine the number of HUs recanvassed after failing DQC*	Using the Production workload estimate and the DQC failure rate for all AAs, calculate the number of HUs recanvassed. *Calculation:* Production workload x DQC failure rate	1,283,037	836,349 *PBOCS & NPC*	HUs
Determine the total U/L QC workload	The QC workload consists of the HUs sampled during DQC and the HUs recanvassed as a result of failing DQC. *Calculation:* DQC sample HUs + recanvassed HUs	2,258,145	1,832,825 *PBOCS & NPC*	HUs

Data Sources: DMD Cost Model, MAF, PBOCS DQC file, NPC DQC form file, Combination file

*This number actually represents all of the HUs worked in all AAs that failed DQC, not just the HUs recanvassed. As a result, the total U/L QC workload double counts the DQC sample HUs in the AAs that failed DQC.

The budgeted Production workload, according to the DMD cost estimate, was 12,830,371 HUs. The Production workload included the number of HUs determined from previous 2010 Census operations, as well as the predicted number of added HUs for U/L. Using the estimated Production workload, the estimated U/L QC workload was 2,258,145, or 17.60 percent of the U/L workload.

6. **Was the sampling plan implemented correctly?**

According to the NPC DQC form file, 99.25 percent of the 186,466 DQC forms contained the correct sample size. Although this shows the majority of the DQC forms contained the correct sample size based on the size of the AA, we only can claim the DQC form contained a line for each unit the QC Enumerator was supposed to check. We cannot ensure the QC Enumerators worked the correct number of HUs in the sample, but it appears the DQC form was generated correctly within PBOCS. The incorrect sample sizes are most likely a result of keying error in either the AA size field or the sample size field, although the keying error is less than the allowed one percent.

In order to verify the implementation of the sampling plan, we used the count of HUs and the sample size captured from the DQC forms at NPC since the HU count recorded in PBOCS is not an accurate representation of the actual number of HUs worked during U/L. As a result, we were only able to check the implemented sampling plan for about 91.90 percent of the AAs worked during the U/L Operation due to missing information.

Refer to Table L5 in Appendix L for the percent of DQC forms keyed in each RCC with the correct sample size.

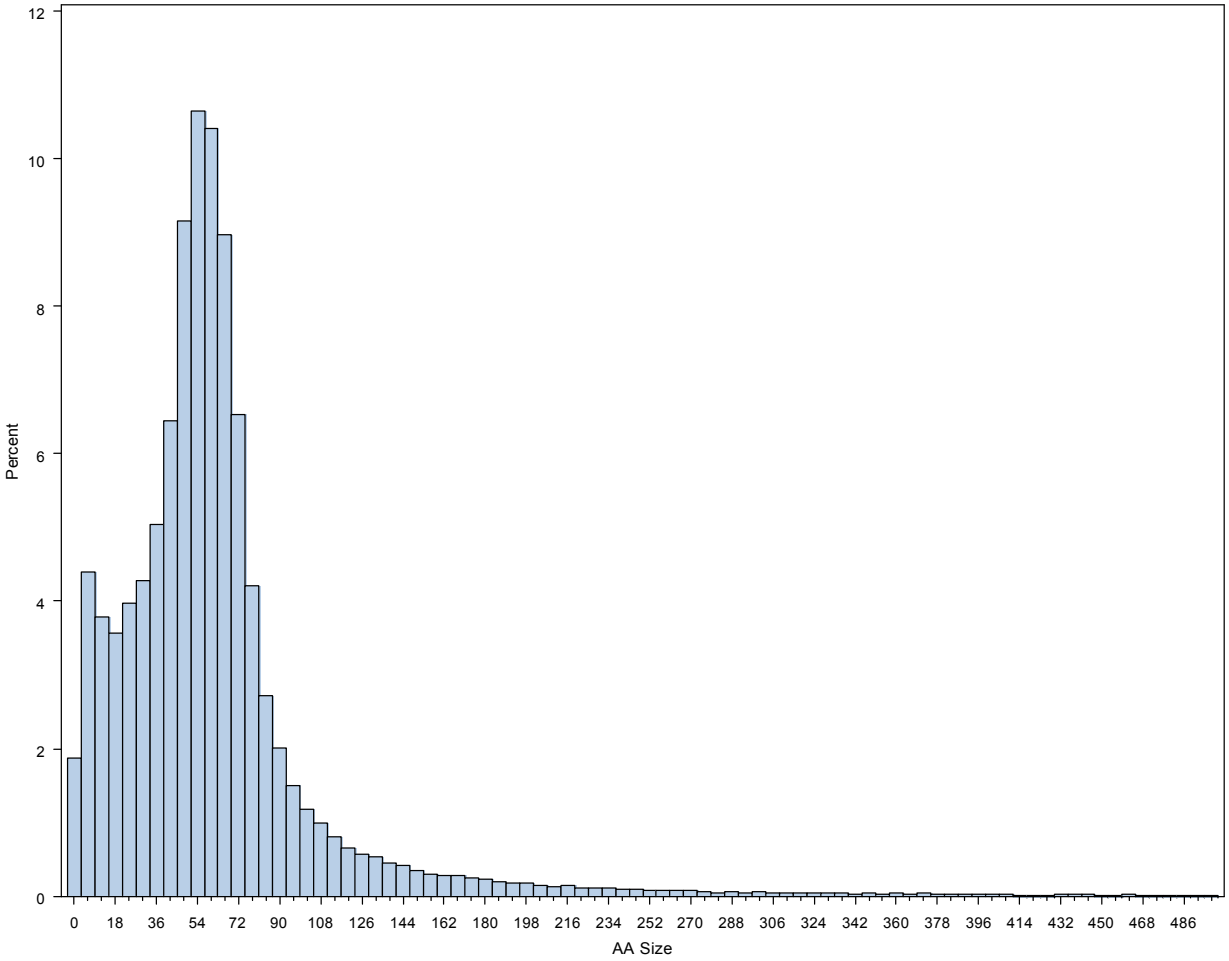
7. **How many AAs were listed?**

During the U/L Operation, all of the 304 LCOs used PBOCS to keep track of the work completed in each AA. The PBOCS file we received contained data for every AA worked in all of these LCOs. A total of 202,890 AAs were listed during U/L, 184,792 AAs in the U.S. and 18,098 AAs in P.R.

In planning the U/L Operation, the average AA size that Field Division was striving for was 65 HUs. According to the combination file, the average AA size during 2010 U/L was 62 HUs. Table L6, in Appendix L, displays the average AA size and the average DQC size for each RCC. The figure displays the number of HUs in each AA for all AAs with less than 500 HUs[18].

[18] Seven hundred fifty-four (0.38 percent) of all of the AAs worked in U/L contained 500 or more units.

Figure: AA sizes for 2010 Update/Leave



Data Source: Combination File - PBOCS DQC File and NPC keyed data file of the DQC Forms
Note: AAs greater than 500 HUs were removed in order to see a better illustration of the distribution of AA sizes. Less than one percent of the AAs were removed. The average AA size according to the 196,533 AAs used in the graph is now between 61 and 62 HUs.

8. **How many AAs were checked in DQC? What percent?**

After the Production Enumerators listed each of the 202,890 AAs, the Production CLs submitted the AA binders to the LCO, where staff assigned AA binders to QC Enumerators. All of the AAs were supposed to be checked during the DQC operation. The PBOCS DQC file contained data not only on the results of the DQC, but also on the transfers of the AA binders between Production and QC Enumerators. DQC data were captured for all 202,890 AAs in PBOCS; however, the DQC pass/fail results for one of the AAs was not captured in PBOCS.

NPC staff received and captured only 199,981 unique DQC forms, which represented 199,981 unique AAs. Therefore, although all AAs were

checked during the DQC, we received DQC form data for 98.57 percent of the AAs.

On average, a Production Enumerator worked around five AAs, and the largest number of AAs worked by a Production Enumerator was 289[19]. A QC Enumerator checked on average 21 AAs, and the largest number of AAs worked by a QC Enumerator was 499. The average DQC sample size for all AAs was around five HUs.

Refer to Table L7 in Appendix L for the percentage of AAs checked in DQC for each RCC.

9. **How many AAs failed? What percent?**

Failure Rates

An AA failed DQC when the QC Enumerator discovered too many discrepancies between the ground and the address information collected in the AA binder. An AA could have failed as a result of too many critical errors or noncritical errors, depending on the size of the AA. According to PBOCS, 12,241 of the 202,889 AAs with DQC results failed and were recanvassed. The failure rate was 6.03 percent for the entire U/L universe. Unfortunately, we were unable to separate the U/L failure rate from the UU/L failure rate. It would be beneficial in future operations to compare the success of the DQC by TEAs, in order to draw conclusions about the design of the quality check programs.

Of the 191,881 forms containing results captured at NPC, 6.68 percent, or 12,812 AAs, failed DQC and required recanvassing. Although over 10,000 DQC forms were missing, the number of AAs that failed DQC was larger than the number that failed as recorded in PBOCS. Of the 191,366 AAs contained in both the PBOCS DQC file and the NPC DQC form file with recorded results, 2,758 of the AAs contained different results. Perhaps a mixture of keying errors in the LCO, illegible DQC forms resulting in keying errors at NPC, and misunderstanding of procedures account for the remaining discrepancies between the pass/fail decisions recorded in PBOCS and captured from the actual D-1190 (UL) DQC forms at NPC. We would expect the pass/fail decisions recorded in PBOCS to match the pass/fail decision captured at NPC. For more information on mismatched results, refer to Appendix M.

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[19] In an effort to expedite AA assignment in PBOCS, some LCO clerks assigned multiple AAs to CLs instead of individually to Enumerators. Since it was possible in PBOCS for a CL to be assigned work on an AA, the AAs may not have been reassigned to the appropriate Production Enumerator when the actual canvassing was completed. As a result, multiple AAs may incorrectly have been assigned to one CL resulting in a fewer number of Production Enumerators in PBOCS.

In addition to reporting on the results of the DQC, we reported on how often Enumerators correctly passed or failed the AA based on the recorded critical and noncritical errors and the allowable critical and noncritical errors. Of the 191,881 DQC forms with results captured at NPC, 784 AAs were marked as passed when the AA binder should have failed and 507 AAs were recanvassed when they should have passed (190,590 were correctly identified). Therefore, 0.67 percent of the DQC forms captured at NPC contained inaccurate pass/fail decisions.

Removing these forms decreased the number of AAs that failed DQC from 12,812 to 12,305 based on the data collected on the forms, which indicates 6.46 percent of AAs failed DQC, as opposed to the 6.68 percent indicated by the QC Enumerator decision. However, these results assume the values of total errors and allowable errors were captured correctly on the DQC forms and at NPC. Table 24 displays the results of the DQC in the PBOCS DQC file, the NPC DQC form file, and the corrected NPC file.

Table 24: Results of the DQC in PBOCS and Data Captured at NPC

	PBOCS		NPC		Correct NPC*	
Results	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
AAs Passed	190,648	93.97	179,069	93.32	178,285	93.54
AAs Failed	12,241	6.03	12,812	6.68	12,305	6.46
All AAs:	**202,889**	**100.00**	**191,881**[†]	**100.00**	**190,590**	**100.00**

Data Source: PBOCS DQC file and NPC keyed data file of the DQC Forms

*The forms with pass/fail decisions incorrectly calculated by the QC Enumerator were removed from these calculations.

[†]There were 8,100 DQC forms excluded from the NPC total form count and one AA from the PBOCS DQC file due to missing DQC Results information.

The failure rate for the U.S. AAs and P.R. AAs were noticeably different with 5.41 percent and 12.44 percent failure rates, respectively, recorded in PBOCS; and 6.01 percent and 13.16 percent recorded according to the NPC captured DQC forms. An explanation for the DQC failure rate being greater in P.R. may simply be that collecting address information is more difficult there. The paper environment of the U/L Operation might have caused a larger failure rate due to the number of variables needed to collect an usable address in P.R. Enumerators have to collect more address information in P.R. compared to Stateside. Not having an automated instrument to guide Enumerators in the collection of these addresses might be the reason for this higher failure rate. A proper evaluation of the P.R. MAF is needed to draw any conclusions about the P.R. addresses. Refer to Table L8 in Appendix L for additional failure results by RCC.

Failed Production Enumerators

The majority of the Production Enumerators had none of their AAs fail the DQC. According to PBOCS DQC file, of the Production Enumerators checked through DQC, 9,560 unique Production Enumerators, or 22.59 percent of the Production Enumerators, worked at least one AA that failed DQC. Around one percent of Production Enumerators had more than two AAs that failed. See Table 25 for the number of AAs for which a Production Enumerator failed, given he or she failed one at least one.

Table 25: Number of AAs Production Enumerators Failed during DQC

Number of AAs Failed DQC	Number of Production Enumerators who worked Failed AAs	Percentage of All Enumerators (42,321)
1	7,577	17.90
2	1,525	3.60
3	320	0.76
4	85	0.20
5	29	0.07
6	13	0.03
7	4	0.01
8	1	0.00
9	5	0.01
≥ 10	1	0.00
All	**9,560**	**22.59**

Data Source: PBOCS DQC file

The steep decline in the number of enumerators associated with increasing number of AA failures suggests that Production Enumerators who canvassed an AA that failed DQC were either retrained, and with the retraining came to understand proper U/L procedures, or were terminated. This is evidence that LCO staff did not take AA failures lightly. For more information on RCC-level data for Production Enumerators who failed an AA during DQC, refer to Table L9 in Appendix L.

10. **What was the incoming error rate?**

For the U/L Operation, prior to canvassing the HUs selected for DQC, the address information verified and updated in the AA binder during the Production phase contained a certain amount of error. The incoming error rate estimates this percentage of error based on the DQC sample results prior to any recanvassing that may have resulted from failed AAs.

Prior to correction, the error rate of the sampled HUs is called the incoming sample error rate (ISER). The ISER and the variance are calculated as follows:

Equation 1: Incoming Sample Error Rate and Variance

$$ISER = \sum_{i=1}^{M} w_i \frac{x_i}{n_i}$$, where

M = number of AAs in the universe
N_i = number of units in AA i
N = the total number of units listed in the operation
n_i = number of units selected for DQC in AA i
x_i = number of units found to have errors in the DQC, which were corrected
$w_i = \frac{N_i}{N}$

$$ISER\ variance = \frac{1}{N^2} \sum_{i=1}^{M} \frac{N_i^2}{n_i} p_i (1 - p_i)$$

where

$$p_i = \frac{x_i}{n_i} \qquad x_i = n_i p_i$$

The ISER is calculated by determining the number of HUs with one or more errors in the DQC sample for each AA divided by the number of HUs selected for DQC in each AA. Each of these calculations is weighted by the number of HUs in the AA divided by the number of total HUs in the operation and then summed across all AAs. In other words, the ISER is the weighted average of the error rates over all AAs.

We used the DQC forms keyed at NPC to calculate the ISER, since the error data were not captured in PBOCS. We removed forms with missing data and incorrectly keyed data from the universe prior to calculating the ISER. The ISER for 2010 U/L was 1.59 percent, with a standard deviation that rounds to 0.00 percent. If we had not conducted DQC and recanvassing of any failed AAs, we would expect 1.59 percent of the HU address information to contain a critical error. This is lower than we expected, so we are researching this further.

11. **What was the outgoing error rate?**

After the QC corrections have been made during the QC field work (DQC and any recanvass), the remaining error rate, termed the outgoing error rate, is the error still inherent in the data since we do not check every unit.

Therefore, the listings submitted to the MAF still contain some error, but by design, at some level less than the pre-specified AOQL.

Unlike the incoming error rate, there are two methods to calculate the outgoing error rate (OER). The first method, the biased method, assumes the error rate within the HUs sampled and checked during the DQC is the same as the HUs in the unchecked portion of the AA. A second method removes the bias from the calculation; however, we are unable to calculate the unbiased estimate due to data limitations in U/L. The unbiased estimator requires information about the errors found during recanvassing, which was not collected during the U/L operation. Therefore, we calculated the OER and associated variance using the biased method as follows:

Equation 2: Outgoing Error Rate and Variance

$$biased\,OER = \frac{\sum_{i=1}^{M}\left(N_i - n_i\right)\left(\frac{x_i}{n_i}\right)}{\sum_{i=1}^{M} N_i}$$, where

M = number of AAs in the universe
N_i = number of units in AA i
n_i = number of units selected for DQC in AA i
x_i = number of units found to have errors in the DQC, which were corrected

$$biased\ OER\ variance = \frac{1}{N^2}\sum_{i=1}^{M}\left(\frac{N_i^2}{n_i} - n_i\right)p_i\left(1 - p_i\right)$$

where

$$p_i = \frac{x_i}{n_i} \qquad x_i = n_i p_i$$

The OER for all AAs is the sum of the number of HUs with errors in every passed AA divided by the total number of HUs in all AAs. The estimated OER for 2010 U/L is 1.47 percent, with a standard deviation that rounds to 0.00 percent. Therefore, after the QC corrections, 1.47 percent of the housing HUs still contain errors. This shows some improvement from the incoming error rate, but it is negligible.

12. **How many and what kind of critical errors were there?**

The QC Enumerators recorded both critical and noncritical errors on the DQC form. We defined critical errors as errors that changed the status of the unit. In other words, the critical errors changed a unit from being included on the Address Listing Pages or Add Pages to being removed, and vice versa. For example, if a Production Enumerator corrected or verified the address information for a HU when the HU should have been deleted, this would be termed a critical error because the HU was included in error. Even with a limited number of critical errors, an AA could fail DQC and need to be recanvassed.

The DQC file captured at NPC contained the critical and noncritical errors. See Appendix C for the layout of the DQC form, and the portion of the form used in this analysis. Table 26 contains a description of each critical error and the number of times the error was recorded across all forms. Note that although only one critical error (at most) could logically apply to a given unit, nothing prevented the QC Enumerators from marking more than one. Our results reflect all critical errors marked, even if multiple errors were recorded on the same form.

Table 26: Critical Errors Recorded on the DQC Forms

Description of Critical Error	Count	% of all AAs	% of Critical Errors
Production Enumerator did not add LQ* to Add Page OR Production Enumerator added LQ in error	5,554	2.80	34.66
Production Enumerator verified or corrected address when the address should not have been included in the universe (delete, duplicate, uninhabitable, empty mobile home site, or nonresidential)	4,035	2.04	25.18
Production Enumerator removed the address from the universe (delete, duplicate, uninhabitable, empty mobile home site, or nonresidential) when it should have been verified or corrected	6,436	3.25	40.16
All Critical Errors	**16,025**	**8.09**	**100.00**

Data Source: NPC keyed data file of Update/Leave DQC Forms
* "LQ" stands for Living Quarters.

According to the DQC forms captured at NPC, there were a total of 16,025 critical errors recorded on the 198,096 DQC forms. The most common critical error recorded was when an address was removed from the universe when it should have been verified or corrected. Refer to Table L10 in Appendix L for the number of critical errors recorded in each RCC.

13. **How many and what kind of noncritical errors were there?**

In addition to recording the critical errors, the QC Enumerators captured how often the Production Enumerators' work contained noncritical errors. It took more noncritical errors for an AA to fail DQC. We defined noncritical errors to be any change in the address information contained on the Address Listing Pages or Add Pages, other than the action code. According to the NPC DQC file, there were 45,993 noncritical errors recorded on 198,096 DQC forms. The noncritical errors were as follows:

Table 27: Noncritical Errors Recorded on the DQC Forms

Description of Noncritical Error	Count	% of All AAs	% of Noncritical Errors
House Number Incorrect	7,430	3.75	16.15
Error in Street Name on Listing or Add Page	7,052	3.56	15.33
Incorrect or Missing Unit Designation	3,058	1.54	6.65
Address Incomplete	10,229	5.16	22.24
Map Spot Error	15,623	7.89	33.97
Street or Road Name Not Corrected on Map	2,601	1.31	5.66
All Noncritical Errors	**45,993**	**23.22**	**100.00**

Data Source: NPC keyed data file of Update/Leave DQC Forms

The most common noncritical error was a map spot error. Nearly 34 percent of the noncritical errors were map spot errors. Refer to Table L11 in Appendix L for the number of noncritical errors recorded in each RCC.

14. **What Average Outgoing Quality Limit was the sample designed to achieve?**

The sample was designed to achieve a 5.5 percent weighted AOQL for critical errors and a 15.2 percent weighted AOQL for noncritical errors[20]. The AOQL is defined as the worst quality of address data we would expect across all of the AAs after the U/L and the U/L QC Operations were completed. The AOQL design was created to allow for varying AOQLs based on AA workload sizes. Each row of the AOQL table was its own AOQL plan with varying AOQLs for each AA workload size range. The distribution of the AA workload sizes contained in the AOQL table was determined based on an assumption that the distribution would be similar to that of the Address Canvassing Operation.

[20] For more information on the sample design and for the AOQL table, see Section II in the background section of this report.

Using the data contained in the combination PBOCS and NPC DQC file, the actual overall quality the sample achieved was 7.61 percent for critical errors and 23.42 percent for noncritical errors. Nearly 85 percent of the AAs contained between 3 and 100 HUs.

The average outgoing quality is higher than we expected (we expected less than 5.5 percent for critical errors and less than 15.2 for noncritical errors) because the distribution of AA workload sizes in U/L did not match the distribution of AA workload sizes we used when calculating the expected AOQL. In particular, more AAs than expected fell into the size ranges with higher AOQLs.

For future censuses, it would be beneficial to design an AOQL plan tailored more specifically to the expected U/L AA workload size distribution. See Table 28 for a summary of the AOQL table based on the DQC data colleted from the DQC forms. Refer to Table L12 in Appendix L for a summary of the actual overall AOQL for critical and noncritical errors in each RCC.

Table 28: AOQL Table

# of HUs in AA (x)	DQC Sample	Allowable Critical Errors	Critical AOQL	Allowable Noncritical Errors	Noncritical AOQL	Frequency Count	% of Total Frequency
0	0	0	0.00	1	100.00	5603	2.76
1	1	0	0.00	1	100.00	2036	1.00
2	2	0	0.00	1	75.00	1652	0.81
3	3	0	0.00	1	50.00	1513	0.75
3 < x <= 50	3	0	10.72	1	26.72	78373	38.63
50 < x <= 100	5	0	6.71	1	16.20	93139	45.91
100 < x <= 150	8	0	4.35	1	10.28	10700	5.27
150 < x <= 175	9	0	3.88	1	9.15	2415	1.19
175 < x <= 200	10	0	3.52	1	8.25	1668	0.82
200 < x <= 275	14	0	2.52	1	5.93	2649	1.31
275 < x <= 500	25	1	3.33	3	7.87	2392	1.18
500 < x <= 1000	50	2	2.76	5	6.45	690	0.34
x > 1000	75	4	3.40	8	6.93	60	0.03

Data Source: Combination File - PBOCS DQC File and NPC keyed data file of the DQC Forms

15. **What's the time lag between when the Production AAs were completed and the DQC AAs were started in the field?**

On average, the time between when a Production Enumerator completed an AA and it was checked into the office and when a QC Enumerator started DQC on the same AA was one day. After a Production Enumerator completed canvassing an AA, he or she returned the AA binder to the Production CL for review. Once the CL determined the AA binder was legible and complete, he or she returned the AA binder to the

LCO. An office clerk checked the AA binder into PBOCS and keyed the counts of HUs and OLQs added during canvassing.

PBOCS stored four different dates for the Production Enumerator's work. The first two were the assignment date and the check-out date. The other two were documented after the Production Enumerator completed work. One was called the complete date and the other the check-in date. According to the specifications for the DQC file from PBOCS, these two variables should have had the same value. The original intent was for the completion date to be the date recorded in the AA binder and the check-in date to represent the date the office clerk scanned the AA binder into PBOCS. However, these two variables were not always the same and did not reflect the original intent. Sometimes the check-in variable was a later date, and sometimes the complete date was a later date. In the end, we opted to look at just the check-in date in our analysis of time lags.

Once the AA binder was checked in from Production, the office clerk generated a DQC form for the AA binder, printed the form and inserted it into the AA binder. The office clerk assigned the AA binder to a QC Enumerator in PBOCS, and gave the AA binder to the QC CL, who delivered the AA binder to the appropriate QC Enumerator.

Table 29: Number of days between AA binder Checked in from Production and Checked out for QC

Number	Mean	Standard Deviation	Minimum	Maximum
202,890	1.04	1.75	-9*	29

Data Source: PBOCS DQC file
*Some AAs had negative lag times due to an error in date recording in the PBOCS.

Table 29 reveals some AAs had negative lag times, which is due to an error in date recording in the PBOCS. The system incorrectly allowed an office clerk to check-out an AA binder to DQC before checking it in from Production, or it captured an incorrect date. Either way, the negative periods of time reveal a problem within the PBOCS that was not repaired before the start of U/L. Only four AAs had negative lag times, but there may be other AAs with incorrect lag times, due to the same issue in PBOCS.

To see the average lag time between Production check-in and QC check-out for each RCC, refer to Table L13 in Appendix L.

16. **What's the time lag between when the Production AAs were completed and the DQC AAs were completed in the field (Production check-in to DQC check-in)?**

On average, the lag time between when a Production Enumerator completed an AA and when the QC Enumerator completed the DQC for an AA was nearly eight days. In other words, it took about eight days for an AA binder to be:

- Checked in by an office clerk after the initial canvass (including keying the added units and printing the DQC form)
- Checked out to a QC Enumerator
- Passed on to the QC Enumerator by the QC CL
- Canvassed by the QC Enumerator
- Submitted back to the QC CL for CL review
- Checked back into the LCO

As with the time lag between Production check-in and DQC check-out, there is an AA with a negative lag time. This identifies a problem with the dates captured within PBOCS. Table 30 contains results and other summary statistics for the lag period between Production check-in and QC check-in.

Table 30: Number of days between AA binder Checked in from Production and Checked in from QC

Number	Mean	Standard Deviation	Minimum	Maximum
202,890	7.85	3.99	-2*	37

Data Source: PBOCS DQC file
*Some AAs had negative lag times due to an error in date recording in the PBOCS.

After the QC Enumerator received the AA binder, he or she conducted DQC and, if necessary, recanvassing. After completing the field work, the QC Enumerator submitted the AA binder to the QC CL for review. Upon reviewing the AA binder, the QC CL returned the AA binder to the LCO where an office clerk checked the AA binder into PBOCS and keyed the pass/fail decision of the DQC. Similar to the Production Enumerator dates, four dates were captured for the QC Enumerator as well. The first two dates were the assignment and check-out date. The check-in and completion dates had similar issues as with the Production dates. For the purposes of our analysis we used the check-in date in our study of lag times.

To see the average lag time between Production check-in to DQC check-in for each RCC, refer to Table L14 in Appendix L.

17. **How long did it take to complete the Production AAs in the field (Production check-out to Production check-in)?**

We defined the Production phase of U/L field work as the time between when an AA binder was checked out to a Production CL, and the time the office clerk checked the AA binder into PBOCS. On average, it took nearly 18 days for a Production worker to complete an AA in the field. Note the lag time does not reflect just the amount of time the Production Enumerator canvassed the AA in the field, but instead reflects the amount of time the AA binder was marked as checked out of the office during the Production phase of the operation. The AA binder could have been left in the office for a few days, left in the hands of the CL for a few days, returned to the Production Enumerator multiple times for updates, or contained HUs in a hard-to-canvass area. The AA binder that spent the most time in the Production phase of U/L was out of the office a total of 55 days. Table 31 provides summary statistics on Production phase lag time.

Table 31: Length of the Production Field Work in Days

Number	Mean	Standard Deviation	Minimum	Maximum
202,890	17.61	9.04	0	55*

Data Source: PBOCS DQC file

*LCO staff were encouraged to assign and check-out AA binders prior to the start of the U/L Operation. As a result, it was possible for the length of the production field work to exceed the number of days allotted for the production phase.

After closer inspection, some AA binders had a large number of days in the field during Production because they were being checked out days or possibly weeks prior to the start date of the U/L Operation field work. The LCO clerks were encouraged to assign and check-out AA binders prior to the start of the U/L Operation, in order to provide Production CLs AA binders to hand out immediately following training. The average is skewed high as a result because 160,596 of the 202,890 AA binders were assigned and checked out to a Production worker in PBOCS prior to the start date, March 1, 2010. When interpreting this statistic, the limitations described in this paragraph should be considered. To see the average lag time for Production work for each RCC, refer to Table L15 in Appendix L.

18. **How long did it take to complete the QC AAs in the field (DQC check-out to DQC/recanvass check-in)?**

We defined the QC phase of the U/L field work as the time from when a QC CL received the AA binder following check-out in the office to the time when the office clerk checked in the AA binder and keyed the DQC

results into PBOCS. On average, it took nearly seven days for an AA binder to complete the QC phase of the U/L Operation. Similar to the Production phase lag time, the QC phase lag time does not reflect the amount of time the QC Enumerator conducted DQC and/or recanvassing in the field, but instead reflects the amount of time the AA binder was marked as checked out of the office. The AA binder could have been assigned and checked out early so that the QC CLs could hand out AA binders immediately following training, held up in the LCO, with the QC CL, or with the QC Enumerator for various reasons. The AA binder that was in the field the longest for the QC phase was out of the office for 29 days. See Table 32 for the summary statistics of the QC lag time.

Table 32: Length of the QC Field Work in Days

Number	Mean	Standard Deviation	Minimum	Maximum
202,890	6.81	3.89	0	29

Data Source: PBOCS DQC file

To see the average lag time for the QC phase of U/L for each RCC, refer to Table L16 in Appendix L.

The average lag time in Table 31 included AAs that both passed and failed DQC. AAs that passed and failed DQC have different lag times. As expected, it took less time to complete an AA that passed DQC than an AA that failed DQC and had to be recanvassed. Table 33 displays the distribution of the statistics based on AAs that passed DQC and AAs that failed DQC and were therefore recanvassed.

Table 33: Length of the QC Field Work in Days by DQC Result

DQC Result	Number	Mean	Standard Deviation	Minimum	Maximum
Fail	12,241	8.79	4.62	0	29
Pass	190,648	6.68	3.80	0	29

Data Source: PBOCS DQC file

C. Office Review Results

In most 2010 Census operations, the Office Review Checklists were not captured, but for the U/L Operation the information contained on the forms was necessary for another study, so the forms were sent to NPC for data capture. The results provided below answer basic questions about the Office Review results recorded in the PBOCS DQC file and the data captured from the Office Review Checklists at NPC.

1. **How many AAs were checked during the Office Review(s)? What percent of the total?**

   After U/L close-out, all of the Office Review Checklists were to be shipped to NPC. NPC received and captured 160,327 Office Review Checklists. NPC shipped 19 forms prior to data capture close-out which were subsequently keyed by HQ staff. An additional 742 forms were shipped to HQ at the end of the data capture close-out. A total of 161,088 AAs were checked during the Office Review according to the NPC data capture results, accounting for 79.40 percent of the total number of Office Review Checklists we expected[21].

   Once an AA binder arrived in the LCO and the DQC results were keyed into PBOCS, the office clerk conducted an Office Review to verify the legibility and completeness of the materials in the AA binder. All AA binders were supposed to be checked during the Office Review. According to the PBOCS DQC file, each AA had a recorded pass/fail decision for Office Review.

2. **How many AAs passed the Office Review? Were sent out for repair? Failed the second Office Review?**

   According to the PBOCS DQC file, 9,968 of the 202,890 (4.91 percent) AA binders failed the first Office Review. The 9,968 AA binders should have been sent out for repair, since the only time an AA binder was sent out for repair was when the office staff recorded more than five percent critical errors and needed a field visit to update the AA binder properly. Unfortunately, the PBOCS DQC file did not contain accurate data for the second Office Review. We used the data-captured forms to find out how often an AA binder failed the second Office Review.

   Of the 160,346 data-captured Office Review Checklists at NPC, 153,030 contained results and 8,783 (5.74 percent) recorded a failed outcome for the first Office Review. At least 8,783 should have then been sent out to the field for repair. Table 34 compares the results from PBOCS and NPC. Although the table shows similar percentages of AAs passing the first Office Review, we did not receive data for 48,675 AAs that passed Office Review and another 1,185 AA binders that failed Office Review. Therefore, 24.57 percent of the Office Review Checklists either never made it to data capture at NPC or did not contain the results of the Office Review. This reveals the need for better communication regarding form disposition during census operations, and the need to stress differences in operations, since U/L was the only operation that had Office Review

[21] Unlike the Observation Checklists and DQC forms, the Office Review Checklists were not unduplicated.

Checklists shipped to NPC. Refer to Appendix N for additional first Office Review failure results by RCC.

Table 34: Results of the First Office Review in PBOCS and Data Captured at NPC

	PBOCS		NPC	
Results	**Count**	**Percent**	**Count**	**Percent**
AA Binders Passed	192,922	95.09	144,247	94.26
AA Binders Failed	9,968	4.91	8,783	5.74
All AAs:	**202,890**	**100.00**	**153,030***	**100.00**

Data Source: PBOCS DQC file and NPC keyed data file of the Office Review Checklists
*There were 7,316 Office Review Checklists excluded from the NPC total form count due to missing Office Review Results information.

The pass/fail decision during the Office Review was determined by the degree of difficulty required in correcting any errors found in the AA binders. If an AA binder contained no errors or only errors easily corrected in the LCO (less than five percent critical errors), the AA binder passed the Office Review. If the AA binder passed the first Office Review, the AA was prepared for shipping to NPC. If the office staff needed a field visit to correct the errors in the AA binder because there were more than five percent critical errors, the AA binder failed Office Review. The AA binder was then sent back to the field staff for repair. Once the AA binder was fixed and checked back into the office, it underwent a second Office Review. Regardless of the outcome of the second Office Review, the AA binder was prepared for shipping to NPC.

The office clerks recorded the results of the second Office Review on the same form as the first Office Review Checklist. Of the data-captured Office Review Checklists, 11,737 contained a response to the second Office Review with 10.12 percent (1,188 AA binders) failing the first and second Office Review. These AA binders still contained too many errors for the office clerks to correct in the office even after sending the AA binders to the field for repair. This represents about half a percent of the total AA workload. Due to time limitations, these binders were still shipped to NPC after the second Office Review without further repair.

According to the second Office Review results, more AA binders were checked a second time than failed the first Office Review. These unexpected results can be explained in a few ways:

- LCO clerks may have misunderstood how to complete the Office Review Checklists, since the results of both reviews were captured on the same form.

- Some of the forms captured at NPC contained results from a second Office Review, without results from a first Office Review.

This shows either an error made in completing the form in the LCOs or an error made in data capture at NPC.

- Office clerks could have mistyped the results of the first Office Review in PBOCS, or only recorded the results of the second Office Review. Once an AA binder was marked as having passed Office Review, a clerk could not have recorded a result for a second Office Review.

- Due to the complexities of collecting the second Office Review results on the same form as the first Office Review, NPC staff may have misidentified forms as having two Office Reviews.

For additional results from the data-captured Office Review Checklists, refer to the DSSD 2010 CPEX Results- Census Program for Evaluations and Experiments Evaluation No. A-2, "Evaluation of Automation in Field Data Collection for Address Canvassing."

VI. Conclusions and Recommendations

In this section, we summarize the results from the U/L QC program and provide recommendations for enhancing the U/L QC program in future census operations.

A. Conclusions

- PBOCS reported 42,321 Production Enumerators and 9,643 QC Enumerators worked at least one AA during the U/L Operation. We received a total of 19,376 (45.78 percent) Production Enumerator Observation Checklists and 4,441(46.05 percent) QC Observation Checklists.

- Based on the forms we received, the vast majority of Enumerators demonstrated an understanding of the U/L procedures and had a satisfactory first or second Initial Observation (97.17 percent of Production Enumerators and 98.21 percent of QC Enumerators).

- The most common error observed for Production Enumerators was failing to enter the correct action code of the Address Listing Page. The most common QC Enumerator error observed was failing to show census identification and provide a copy of the Confidentiality Notice to each respondent.

- PBOCS recorded that all 202,890 AAs were worked during the quality check (with one AA missing a result). We received data from 199,981 keyed DQC forms, which is 98.57 percent of the unique AAs.

- QC Enumerators checked 14.49 percent of all addresses canvassed during the U/L Operation. This was less than the 17.60 percent we estimated for the

U/L budget. Approximately eight percent (7.88 percent) of the addresses canvassed during the U/L Operation were checked during the DQC. An additional seven percent (6.61 percent) of the addresses were recanvassed.

- Approximately 99 percent of the AAs were sampled correctly, according to an analysis of the DQC Forms containing a sample size and AA housing unit count. The sample size discrepancies were most likely a result of keying errors.

- According to the DQC information captured in the PBOCS, the average AA size was 62 housing units and a Production Enumerator completed an average of five Assignment Areas. A QC Enumerator completed an average of 21 AAs.

- Between six and seven percent of the AAs failed the DQC (6.03 percent captured in PBOCS and 6.68 percent captured from the forms at NPC). According to the data captured in the PBOCS, 9,560 (22.59 percent) of all Production Enumerators worked at least one AA that failed the DQC.

- The most common critical error recorded during the DQC (40.16 percent of the total recorded critical errors) was a Production Enumerator removing the address from the universe (delete, duplicate, uninhabitable, empty mobile home site, or nonresidential) when it should have been verified or corrected. The most common noncritical error recorded during the DQC (33.97 percent of the total recorded noncritical errors) was a Production Enumerator making or not correcting an error with a map spot number.

- We received data from a total of 161,088 data-captured Office Review Checklists, 79.40 percent of the AAs, although the PBOCS contained the results for all 202,890 AAs.

- Less than six percent of the AAs failed the first Office Review (4.91 percent captured in PBOCS and 5.74 percent captured from the forms keyed at NPC).

- According to the data captured from the Office Review Checklists at the NPC, about ten percent (1,188 of the 11,737) of the AA binders failed the second Office Review and were shipped with errors that the office clerks could not fix.

B. Recommendations

We recommend a similar QC program for the 2020 census for U/L along with the following suggestions for improvement:

- Test the U/L Operation as it will be implemented in the field. Due to budget constraints, the 2008 Census Dress Rehearsal of the U/L Operation was

canceled. As a result, the addition of a separate QC staff was never tested in the field.

- Automate the listing and mapping of the 2020 U/L Operation.

- Conduct the Initial Observations using an automated instrument. Automation will reduce problems with missing forms, unobserved Enumerators, missing data on the forms, and correct the most common errors captured during the Initial Observations.

- If automation is impossible, affix a barcode label on each form and track all of the QC forms. Allow for the control information (such as LCO code) to be pre-printed on the forms and transfer the information to keying. Stress the importance of completing all information on the QC forms and submitting the forms to be data captured.

- Establish an U/L QC sub-team to meet during the planning, testing and implementation phases of the operation, to aid in material development and to monitor the quality of the work completed in the field.

- Consider tracking U/L and UU/L addresses separately for QC analysis, since they encompass two distinctly different types of address areas.

- Determine ways to closely track the field work during the field operation in order to monitor any falsification or procedural issues that may arise during Production. For example, generating control charts based on the DQC fail rates.

- Provide capability to capture two observation results, the first observation and the second observation, on the Observation Checklist, D-1222 (UL).

- Determine and include the data capture experts during the forms design process.

- Determine a better way to include the blocks with no housing units in the starting unit selection for the DQC.

- Consider developing and implementing a verification plan for clerk data entry into the OCS in the LCOs, such as a quality check on keying the DQC pass/fail decision.

- Ensure the distribution of AA sizes used when calculating the weighted AOQL accurately reflects the distribution of AA sizes planned for the field operation.

- Determine the desired outgoing quality achieved during the DQC, instead of dictating the DQC sample percent based on the budget alone.

VII. Acknowledgements

Special thanks to Rodrick Marquette, Patricia Hartman, and Francis Anderson for their assistance with the review and completion of this Quality Profile. Thanks also to the critical reviewers who took the time to review the content and accuracy of the results reported in this Quality Profile.

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D-972 (UL)

U.S. Department Of Commerce
Economic and Statistics Administration
U.S. Census Bureau

AA BINDER ASSEMBLY QC CHECKLIST
OPERATION: UPDATE/LEAVE
2010 Census

A. Assembly Clerk name

B. Reviewer name

Instructions

Use the **AA Binder Assembly Questions** in the D-530 (UL), Update/Leave Office Manual to review each binder. Please mark (X) as appropriate for any related error.

Line No.	AA (1)	Error(s) committed – *Mark (X) in the appropriate column(s)* (2)								
		Error 1	Error 2	Error 3	Error 4	Error 5	Error 6	Error 7	Error 8	No Errors
1										
2										
3										
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										
20										
21										
22										
23										
24										
55										
26										
27										
28										
29										
30										

RULES

Check the first 3 binders assembled by the clerk identified in item (A) and:

► If all 3 binders have no errors - *Check the 10th binder.*
If the 10th binder –
— Has no errors – *Continue checking every 10th binder.*
— Has an error(s) – *Check the next 3 binders*.
- If there are no errors - *Continue checking every 10th binder.*
- If there are errors in any, *Notify your supervisor.*

► If any of the first 3 binders has an error(s) - *Check the 4th, 5th and 6th binders*
- If the 4th, 5th and 6th binders have no errors *Continue checking every 10th binder.*
- If the 4th, 5th or 6th binders have errors – *Notify your supervisor.*

Instructions

Use the **AA Binder Assembly Questions** in the D-530 (UL), Update/Leave Office Manual to review each binder. Please mark (X) as appropriate for any related error.

Line No.	AA (1)	Error(s) committed – *Mark (X) in the appropriate column(s)* (2)								
		Error **1**	Error **2**	Error **3**	Error **4**	Error **5**	Error **6**	Error **7**	Error **8**	No Errors
31										
32										
33										
34										
35										
36										
37										
38										
39										
40										
41										
42										
43										
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46										
47										
48										
49										
50										
51										
52										
53										
54										
55										
56										
57										
58										
59										
60										

RULES

Check the first 3 binders assembled by the clerk identified in item (A) and:

► If all 3 binders have no errors - *Check the 10th binder.*
If the 10th binder –
— Has no errors – *Continue checking every 10th binder.*
— Has an error(s) – *Check the next 3 binders*.
- If there are no errors - *Continue checking every 10th binder.*
- If there are errors in any, *Notify your supervisor.*

► If any of the first 3 binders has an error(s) - *Check the 4th, 5th and 6th binders*
- If the 4th, 5th and 6th binders have no errors *Continue checking every 10th binder.*
- If the 4th, 5th or 6th binders have errors – *Notify your supervisor.*

This report contains information protected by the Privacy Act of 1974 (Title 5, U.S.C., Section 552a). The Privacy Act requires appropriate safeguards to be taken to ensure the security and confidentiality of this information. The information is restricted to authorized uses by individuals with a need-to-know.

FORM D-1222(UL) U.S. DEPARTMENT OF COMMERCE
Economics and Statistics Administration
U.S. CENSUS BUREAU

OBSERVATION CHECKLIST
UPDATE/LEAVE
2010 CENSUS

IDENTIFICATION ITEMS

1. Employee Name			**2.** Applicant ID
3. Type of observation *Mark (X) one*	☐ Production ☐ QC		
4. Observer name(s)	**5.** Date (*Month/Day*)	**6.** No. of listings observed	**7.** CLD No.
1st Observation	/		
2nd Observation	/		**8.** LCO No.

SAFETY & SECURITY REMINDERS

- It is mandatory to wear a seatbelt at all times.
- Protect all Title 13 data or any medium that may contain personally identifiable information.
- Any lost or stolen medium containing Title 13 data or personally identifiable information must be reported as soon as possible according to the instructions in your manuals.

GENERAL INSTRUCTIONS

- Use this checklist to evaluate and document overall performance of Production/QC Enumerators as you observe them in the field.
- As you are observing, keep in mind the tasks listed.
- For every task listed, mark "***X***" in the appropriate column:
  - **Y** - Yes, task observed and performed correctly
  - **N** - No, task observed but not performed correctly - *Discuss proper procedure before observing next address .*
  - **N/A** - Not Applicable, task not observed - *Discuss proper procedure at the end of the observation.*
- Use **Section A** to record performance for Production Enumerators.
- Use **Section B** to record performance for QC Enumerators.
- Record observation results in **Section C** for both Production and QC Enumerators.

Section A -- OBSERVATION PERFORMANCE (Production Enumerators)

Tasks	1st Observation			2nd Observation		
	Y	**N**	**N/A**	**Y**	**N**	**N/A**
1. Canvassed in the correct block						
2. Checked for living quarters at every structure on the right while canvassing a block						
3. Interviewed or attempted to interview someone at every structure, including commercial and nonresidential addresses						
4. Contacted or attempted to contact a building manager, superintendent, or other knowledgeable person at each multi-unit structure						
5. Showed Census identification and provided a copy of the D-31, Confidentiality Notice, to each respondent						
6. Entered the correct Action Code in Column (5a) for each address on the Address Listing Page						
7. Entered the correct line number (from Column (1)) in Column (5b) of the Address Listing Page for listings assigned the D2 Action Code						
8. For living quarters missing map spot numbers in Column (4) of the Address Listing Page, correctly added a map spot and map spot number to the Block Map and added the map spot number in Column (4)						
9. Added available but missing house numbers in Column (6a) of the Address Listing Page						
10. Made appropriate updates in Columns (6b), (6c), (6d), (7a), (7b), and (8) of the Address Listing Page for all addresses						
11. Entered a location description in Column (8) of the Address Listing Page for housing units without a house number						
12. Correctly added missing living quarters to the appropriate Update/Leave Add Page						
13. Verified that the living quarter's map spot and block number on the Block Map matched the living quarter's map spot and block number on the Address Listing Page						
14. Verified or corrected the map spot location for all living quarters on the Block Map						
15. Correctly added or deleted map spots on the Block Map						
16. Correctly made updates to street features on the Block Map						
17. Verified that the geographic codes on the preaddressed questionnaire address label matched the Address Listing Page						
18. For added housing units, correctly copied the Processing ID from the questionnaire address label to Column (3) of the Update/Leave Add Page for Housing Units						
19. Corrected the housing unit's address on the preaddressed questionnaire label to reflect changes made to the address on the Address Listing Page						
20. Entered D1, D2, E, N, or U on the preaddressed questionnaire label for each undeliverable questionnaire						

Section B -- OBSERVATION PERFORMANCE (QC Enumerators)

Tasks	1st Observation			2nd Observation		
	Y	N	N/A	Y	N	N/A
1. Filled Items (1), (2), (3), and (4) of the Dependent Quality Control form correctly, when necessary						
2. Marked the appropriate error items on the Dependent Quality Control form						
3. Correctly totaled the errors (Items 16 and 17) on the Dependent Quality Control form						
4. Correctly determined pass/fail results (Item 18) on the Dependent Quality Control form						
5. Worked in the correct block						
6. Checked for living quarters at every structure on the right while canvassing a block						
7. Interviewed or attempted to interview someone at every structure, including commercial and nonresidential addresses						
8. Contacted or attempted to contact a building manager, superintendent, or other knowledgeable person at each multi-unit structure						
9. Showed Census identification and provided a copy of the D-31, Confidentiality Notice, to each respondent						
10. Entered the correct line number (from Column (1)) in Column (5b) of the Address Listing Page for listings assigned the D2 Action Code						
11. For living quarters missing map spot numbers in Column (4) of the Address Listing Page, correctly added a map spot and map spot number to the Block Map and added the map spot number in Column (4)						
12. Added available but missing house numbers in Column (6a) of the Address Listing Page						
13. Made appropriate updates in Columns (6b), (6c), (6d), (7a), (7b), and (8) of the Address Listing Page for all addresses						
14. Entered a location description in Column (8) of the Address Listing Page for housing units without a house number						
15. Correctly added missing living quarters to the appropriate Update/Leave Add Page						
16. Verified that the living quarter's map spot and block number on the Block Map matched the living quarter's map spot and block number on the Address Listing Page						
17. Verified or corrected the map spot location for all living quarters on the Block Map						
18. Correctly added or deleted map spots when necessary						
19. Correctly made updates to street features on the Block Map						
20. For Added housing units, correctly copied the Processing ID from the questionnaire address label to Column (3) of the Update/Leave Add Page for Housing Units						

Section C -- OBSERVATION RESULTS

- **Mark "Satisfactory"** if the Enumerator demonstrated a good overall understanding of the tasks
- If you believe the Enumerator did **NOT** demonstrate a good overall understanding of the tasks, contact your immediate supervisor to discuss action to be taken (retraining, 2nd observation, mark "Unsatisfactory," etc)
  - **Do not mark "Unsatisfactory"** unless instructed by your supervisor
- **Mark "Other"** if the Enumerator has resigned before you could observe him/her in the field
- **Notes** are required detailing procedural problems observed and actions to be taken

☐ **Satisfactory -** By the end of observation, Enumerator understands and follows procedures.

☐ **Unsatisfactory -** By the end of observation, Enumerator does NOT understand or follow procedures. *Notes are required*

☐ **Other -** For example, Enumerator resigned before observation could take place. *Notes are required*

NOTES

Form **D-1222(UL-PR)**
7/7/2009

U.S. DEPARTMENT OF COMMERCE
Economics and Statistics Administration
U.S. CENSUS BUREAU

OBSERVATION CHECKLIST
UPDATE LEAVE
2010 CENSUS

IDENTIFICATION ITEMS

1. Employee Name:			**2.** Applicant ID
3. Type of Observation *Mark (X) one*		Production: _____	QC: _____
4. Observer name(s):	**5.** Date [*Month/Day*]:	**6.** No. Listings Observed:	**7.** CLD No:
1st Observation	/		
2nd Observation	/		**8.** LCO No:

SAFETY & SECURITY REMINDERS

- It is mandatory to wear a seatbelt at all times, even when pulled to the side of the road.
- Protect all Title 13 data or any medium that may contain personally identifiable information.
- Any lost or stolen medium containing Title 13 data or personally identifiable information must be reported as soon as possible according to the instructions in your manuals.

GENERAL INSTRUCTIONS

- Use this checklist to evaluate and document overall performance of Production/QC Enumerators as you observe them in the field.
- As you are observing, keep in mind the tasks listed.
- For every task listed, mark "X" in the appropriate column:
  - **Y** - Yes, task observed and performed correctly
  - **N** - No, task observed but not performed correctly - *Discuss proper procedure before observing next address.*
  - **N/A** - Not Applicable, task not observed - *Discuss proper procedure at the end of observation.*
- Use **Section A** to record performance for Production Enumerators.
- Use **Section B** to record performance for QC Enumerators.
- Record observation result in **Section C** for Production and QC Enumerators

Section A -- OBSERVATION PERFORMANCE (Production Enumerators)

Tasks:	1st Observation			2nd Observation		
	Y	**N**	**N/A**	**Y**	**N**	**N/A**
1. Canvassed in the correct block						
2. Checked for living quarters at every structure on the right while canvassing a block						
3. Interviewed or attempted to interview someone at every structure, including commercial and nonresidential addresses						
4. Contacted or attempted to contact a building manager, superintendent, or other knowledgeable person at a multi-unit structure						
5. Showed Census identification and provided a copy of the D-31, Confidentiality Notice, to each respondent						
6. Entered the correct Action Code in Column (5a) for each address on the Address Listing Page						
7. Entered the correct line number (from Column (1)) in Column (5b) of the Address Listing Page for listings assigned the D2 Action Code						
8. For living quarters missing map spot numbers in Column (4) of the Address Listing Page, correctly added a map spot and map spot number to the Block Map and added the map spot number in Column (4)						
9. Added available but missing house numbers in Column (6a) of the Address Listing Page						
10. Made appropriate updates in Columns (6b)-(6k), (6m), (6n), (6p) and (7) of the Address Listing Page for all addresses (see Section D for complete address information)						
11. Correctly added missing living quarters to the appropriate Update/Leave Add Page						
12. Verified that the living quarter's map spot and block number on the Block Map matched the living quarter's map spot and block number on the Address Listing Page						
13. Verified or corrected the map spot location for all living quarters on the Block Map						
14. Correctly added or deleted map spots from the Block Map						
15. Correctly made updates to street features on the Block Map						
16. Verified that the geographic codes on the preaddressed questionnaire address label matched the Address Listing Page						
17. For added housing units, correctly copied the Processing ID from the questionnaire address label to Column (3) of the Update/Leave Add Page for Housing Units						
18. Corrected the housing unit's address on the preaddressed questionnaire label to reflect changes made to the address on the Address Listing Page						
19. Entered D1, D2, E, N, or U on the preaddressed questionnaire label for each undeliverable questionnaire						

Section C -- OBSERVATION RESULT

- **Mark "Satisfactory"** if the Enumerator demonstrated a good overall understanding of the tasks
- If you believe the Enumerator did NOT demonstrate a good overall understanding of the tasks, contact your immediate supervisor to discuss action to be taken (retraining, 2nd observation, mark "Unsatisfactory", etc)
  - Do not **mark "Unsatisfactory"** unless instructed by your supervisor
- **Mark "Other"** if the Enumerator has resigned before you could observe him/her in the field
- Notes are required detailing procedural problems observed and actions to be taken (on the back)

[ ] Satisfactory -- By the end of observation, Enumerator understands and follows procedures.

[ ] Unsatisfactory -- By the end of observation, Enumerator does NOT understand or follow procedures. *Notes are required*

[ ] Other -- for example, employee resigned before observation could take place. *Notes are required*

Section B -- OBSERVATION PERFORMANCE (QC Enumerators)						
	1st Observation			2nd Observation		
Tasks:	Y	N	N/A	Y	N	N/A
1. Filled Items (1), (2), (3) and (4) of the Dependent Quality Control form correctly, when necessary						
2. Marked the appropriate error items on the Dependent Quality Control form						
3. Correctly totaled the errors (items 16 and 17) on the Dependent Quality Control form						
4. Correctly determined pass/fail results (item 18) on the Dependent Quality Control form						
5. Worked in the correct block						
6. Checked for living quarters at every structure on the right while canvassing a block						
7. Interviewed or attempted to interview someone at every structure, including commercial and nonresidential addresses						
8. Contacted or attempted to contact a building manager, superintendent, or other knowledgeable person at a multi-unit structure						
9. Showed Census Identification and provided a copy of the D-31, Confidentiality Notice, to each respondent.						
10. Entered the correct line number (from Column (1)) in Column (5b) of the Address Listing Page for listings assigned the D2 Action Code						
11. For living quarters missing map spot numbers in Column (4) of the Address Listing Page, correctly added a map spot and map spot number to the Block Map and added the map spot number in Column (4)						
12. Added available but missing house numbers in Column (6a) on the Address Listing Page						
13. Made appropriate updates in Columns (6b)-(6k), (6m), (6n), (6p) and (7) of the Address Listing Page for all addresses (see Section D for complete address information)						
14. Correctly added missing living quarters to the appropriate Update/Leave Add Page						
15. Verified that the living quarters map spot and block number on the Block Map matched the living quarter's map spot and block number on the Address Listing Page						
16. Verified or corrected the map spot location for all living quarters on the Block Map						
17. Correctly added or deleted map spots on the Block Map						
18. Correctly made updates to street features on the Block Map						
19. For Added housing units, correctly copied the Processing ID from the preaddressed questionnaire address label to Column (3) of the Update/Leave Add Page for Housing Units						

Section D - IDENTIFYING COMPLETE ADDRESSES	
Verify that the Enumerator updates enough columns on the Address Listing and Add Pages to ensure one of the following complete address combinations:	
Address Listing Page	
House Number and Street Address	(6a) + ((6d) or (6k) or (6m)) + (6p)
Location Description and Street Address	((6d) or (6k) or (6m)) + (6p) + (7)
Urbanization and House Number	(6a) + (6b) + ((6c) = 1) + (6p)
Urbanization and Location Description	(6b) + ((6c) = 1) + (6p) + (7)
Apartment Complex	(6b) + ((6c) = 2 or 3) + (6h) + (6p)
Add Page Housing Units	
House Number and Street Address	(4a) + ((4h) or (4k) or (4m)) + (6)
Location Description and Street Address	((4h) or (4k) or (4m)) + (5) + (6)
Urbanization and House Number	(4a) + (4b) + ((4c) = 1) + (6)
Urbanization and Location Description	(4b) + ((4c) = 1) + (5) + (6)
Apartment Complex	(4b) + ((4c) = 2 or 3) + (4j) + (6)
Add Page Other Living Quarters	
House Number and Street Address	(5a) + ((5h) or (5k) or (5m)) + (7)
Location Description and Street Address	((5h) or (5k) or (5m)) + (6) + (7)
Urbanization and House Number	(5a) + (5b) + ((5c) = 1) + (7)
Urbanization and Location Description	(5b) + ((5c) = 1) + (6) + (7)
Apartment Complex	(5b) + ((5c) = 2 or 3) + (5j) + (7)

NOTES

D-1190(UL)

Dependent Quality Control

Operation: Update/Leave
2010 Census

U.S. Department of Commerce
Economics and Statistics Administration
U.S. Census Bureau

RCC/LCO/AA: 2199 / 2146 / 000111
ST/COU: 88/008 Test Data/Summer
CLD: 1234
Number of Addresses in AA: **392**

Create Date/Time: 10/08/2009 04:25 PM ET
Print Date/Time: 10/08/2009 04:25 PM ET

Production Enumerator Applicant ID: ENM31884658

Instructions: Start U/L DQC at line 112 on the Listing Page and continue with next 4 units on the ground.

				Critical Errors *(Mark ✓ to indicate type of error)*				**Non-Critical Errors** *(Mark ✓ to indicate type of error)*						
Type of Page	Page and Line Number	**Production Enumerator Action Code** (Enter 'Add' if LQ appears on an Add Page. Enter 'No LQs' if no LQs in block. Leave blank if LQ doesn't appear on any page.)	**QC Enumerator Action Code** (Enter **your** action code here. Enter 'Add' if LQ correctly appears on an Add Page or if you add a new LQ. Enter 'No LQs' if no LQs in block.)	Production Enumerator **did not add LQ** to Add Page **OR** Production Enumerator **added LQ in error.**	Do the action codes from items 3 and 4 **differ** in one of the following combinations? **Production** Action Code (Item 3) is either **V or C** and **QC (Your)** Action Code (Item 4) is either **D1, D2, U, E or N**	Do the action codes from items 3 and 4 **differ** in one of the following combinations? **Production** Action Code (Item 3) is either **D1, D2, U, E or N** and **QC (Your)** Action Code (Item 4) is either **V or C**	Are there any checks in items (5) - (7)? *(Enter Y or N.)*	House Number Incorrect	Error in Street Name on Listing or Add Page	Incorrect or Missing Unit Designation	Address Incomplete *	Map Spot Error: Out of Sequence on Map, or Not Added or Deleted on Map	Street or Road Name Not Corrected on Map	Are there any checks in items (9) - (14)? (Enter Y or N.)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
☐ Listing Page ☐ HU Add Page ☐ OLQ Add Page	Page ___ Line ___													
☐ Listing Page ☐ HU Add Page ☐ OLQ Add Page	Page ___ Line ___													
☐ Listing Page ☐ HU Add Page ☐ OLQ Add Page	Page ___ Line ___													
☐ Listing Page ☐ HU Add Page ☐ OLQ Add Page	Page ___ Line ___													

16. **Total Number of "Y" Entries in Item (8) over all pages:** ____

17. **Total Number of "Y" Entries in Item (15) over all pages:** ____

18. **DQC Result** (Mark "Fail" if Item 16 is greater than **1** or Item 17 is greater than **3** ; otherwise mark "Pass"): ☐ **Pass** ☐ **Fail** → *Recanvass remaining addresses in AA*

19. **Date DQC Completed** (mm/dd/yy): / /

20. **QC Enumerator Name:** ____

* *See Update/Leave Quick Reference Guide (Form D-535 (QC) for more information on complete address.*

21. **QC Enumerator Applicant ID:** ____

Action Codes: **V** - Verify **C** - Correction **D1** - Delete **D2** - Duplicate **U** - Uninhabitable **N** - Nonresidential **E** - Empty Mobile Home Site **Z** – OLQ (preprinted only - do not enter this code)

D-1190(UL QC) PR

Control De Calidad Dependiente

Operación: Control De Calidad Para La Operación Actualización/Entrega
Censo del 2010

Departamento de Comercio de los Estados Unidos
Administración de Economía y Estadísticas
Negociado del Censo de los EE.UU.

RCC/LCO/AA: 2102 / 2153 / 123456
ST/COU: 72/023 Cabo Rojo/Puerto Rico
CLD: 1234
Cantidad de direcciones en el AA: **62**

Número de ID del Enumerador de Producción: FLD31003171

Fecha en que se creó/Hora: 09/23/2009 05:06 PM ET
Fecha en que se imprimió/Hora: 09/23/2009 05:06 PM ET

Instrucciones: ***Empiece el DQC de Actualización/Entregaen la línea 46 y continúe con las próximas 4 unidades en el lugar.***

				Errores Críticos *(Marque✓ para indicar la clase de error)*				**Errores No-Críticos** *(Marque ✓ para indicar la clase de error)*						
					¿Los códigos de acción de las partidas 3 y 4 **difieren** en una de las siguiente combinaciones?									
Tipo de Página	Número de Página y Línea	**Código de Acción del Enumerador de Producción** (Escriba "Añadido" si el LQ aparece en una Página para Añadir. Escriba "No hay LQs" si no hay LQs en el bloque. Deje en blanco si el LQ no aparece en ninguna página.)	**Código de Acción del Enumerador de QC** (Escriba su código de acción aquí. Escriba "Añadido" si el LQ aparece correctamente en una Página para Añadir o si añade un nuevo LQ. Escriba "No hay LQs" si no hay LQs en el bloque.)	**LQ No Añadido** a la Página para Añadir por el Enumerador de Producción **O LQ Añadido erróneamente** por al Enumerador de Producción.	El código de a ción de **producción** (partida 3) es **V** o **C** y el código de a ción de **QC** (partida 4) es **D1, D2, U, E o N**	El código de acción de **producción** (partida 3) es **D1, D2,U, E o N** y el código de acción de **QC** (partida 4) es **V o C**	¿Hay alguna marca en la partidas (5) a la (7)? Escriba S o N	Número de Casa Incorrecto	Error en el Nombre de Calle en la Página de Lista o para Añadir	Falta Identificación de la Unidad	Dirección Incompleta*	Error de Punto en el Mapa: Fuera de Secuencia en el Mapa, o Sin Añadir o Borrado en el Mapa	Nombre de Calle o Carretera sin Corregir en el Mapa	¿Hay alguna marca en las partidas (9) a la (14)? Escriba S o N
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)
☑ Lista de direcciones ☐ Página para añadir OLQ ☐ Página para añadir HU	Página 11 Línea 46													
☐ Lista de direcciones ☐ Página para añadir OLQ ☐ Página para añadir HU	Página ___ Línea ___													
☐ Lista de direcciones ☐ Página para añadir OLQ ☐ Página para añadir HU	Página ___ Línea ___													
☐ Lista de direcciones ☐ Página para añadir OLQ ☐ Página para añadir HU	Página ___ Línea ___													
☐ Lista de direcciones ☐ Página para añadir OLQ ☐ Página para añadir HU	Página ___ Línea ___													
				16. **Total de "S" Anotadas en la Columna (8) en todas las páginas:**				17. **Total de "S" Anotadas en la Columna (15) en todas las páginas:**						

18. **Resultado del DQC** *(Marque "Falló" si la línea 16 es mayor que* **1** *o si la línea 17 es mayor que* **3** *; de lo contrario, marque "Pasó"):* ☐ **Pasó** ☐ **Falló** → *Volver a recorrer el AA*

19. **Fecha que fue Completado el DQC (mm/dd/aa):** / /

20. **Nombre del Enumerador de QC:**

** Vea la Guía de Referencia Rápida para Actualización/Entrega [Forma D-535(UL)(PR)] para obtener más información sobre direcciones completas.*

21. **ID de Solicitante del Enumerador de QC:**

Código de Acción: **V** - Verificada **C** – Corregida **D1** – Eliminada **D2** – Duplicada **U** – Inhabitable **N** – No residencial **E** - Lote vacío de casa móvil **Z** - (Preimpreso solamente - no escriba este código)

FORM **D-446 (UL)**
(10-22-2009)

U.S. DEPARTMENT OF COMMERCE
Economics and Statistics Administration
U.S. CENSUS BUREAU

OFFICE REVIEW CHECKLIST
OPERATION: UPDATE/LEAVE
2010 Census

1. RCC	
2. LCO	
3. CLD	
4. AA	
5. Total Units (D–105A + D–105B + D–105C)	

A. COMPLETENESS CHECK

1. *Verify the following materials are present;*

- D-451 (UL), Update/Leave Cover/Daily Log
- D-1190 (UL QC), Update/Leave Dependent Quality Control (DQC)
- D-105A (UL), Update/Leave Address Listing Page
- Map Sheets for each block in the AA
- D-105B (UL), Update/Leave Add Page for Housing Units (confirm that the total number of pages listed are present)
- D-105C (UL), Update/Leave Add Page for Other Living Quarters (confirm that the total number of pages listed are present)

2. *Verify that Item (2e), 'Date Completed,' has an entry on the D-451 (UL), Update/Leave Cover/Daily Log.*

If any of the above materials are missing, Stop Office Review and contact the QC field staff for appropriate action. Otherwise, continue the Office Review.

B. ERROR CHECK – *Check every item as described below. Record one tally in either Column (2) or Column (3), as appropriate, for* ***each*** *error you encounter.*

Critical – Errors that cannot be corrected in the office and must be corrected by a QC Enumerator.

Noncritical – Errors that can be corrected in the office.

Error Descriptions (1)	Critical (2)	Noncritical (3)
Address Listing Page		
1. Action Code in Column (5a) is missing or invalid.		
2. Action Code does not have the following corresponding entries: **C –** Corrections are entered in Columns (6a), (6b), (6c), (6d), (7a), (7b), or (8); information is added to Column (4) **D2 –** Line number of duplicate address is entered in Column (5b). **V, D1, N, U, and E –** No other entries required.		
3. Location Description (Column (8)) and/or Street or Road Name (Column (6b)) is missing for units without a House Number (Column (6a)) (unless unit has preprinted 'Z' in Column (5a)).		
4. Map Spot Number (Column (4)) is blank (unless unit has a preprinted 'Z' in Column (5a)).		
Add Pages (Housing Units or Other Living Quarters)		
5. Any of the following required fields are not completed on the Add Pages: • Block Number (Item (1)) • Map Spot (Item (2)) • Processing ID (Item (3) – for Housing Units only) • Street or Road Name (Item (4b)) • ZIP Code (Item (4d))		
6. House number (Item 4a)) and Location Description (Item (6)) both blank.		
7. Non-city style mailing address (Item (5a)), including ZIP Code (Item (5b)), is blank when there is no House Number (Item (4a)) and Street or Road Name (Item (4b)).		
8. RCC, LCO, AA, State Code, County Code, and/or Page ____ of ____ are blank.		
Census Block Maps		
9. Entry on the Address Listing Pages or Add Pages do not have a corresponding map spot and map spot number entered on the Block Map.		
10. Map spot is deleted on the Block Map without a corresponding deleted address on the Address Listing Page.		
11. Updated street/road name does not have corresponding updates reflected on the Address Listing Pages and/or Add Pages, if there are units listed for the street/road.		
Legibility		
12. Entries are not legible on the Address Listing Page, Add Pages, or Block Maps and **cannot be fixed in the office.**		
13. Entries are not legible on the Address Listing Page, Add Pages, or Block Maps and **can be fixed in the office.**		
14. TOTAL ERRORS – ***Sum of tally in Columns (2) and (3)*** →		
15. Critical Error Rate – ***Total of Column (2)/Total Units * 100)*** Example: if the total of Column (2) is 5, and the Total Units is 50, the critical error rate is 5/50 = .1 → * 100 = 10%. →	%	

C. First Office Review Results

1 ☐ **Pass –** If Critical Error Rate is less than or equal to 5%. *The binder can be prepared for shipping.*

2 ☐ **Fail –** If Critical Error Rate is greater than 5%. *Check the binder out to QC field staff for Repair.*

Any binder checked out to QC field staff for Repair must be reviewed again after the assignment is completed. Follow the instructions in Section A, 'Completeness Check.' Next, check the errors identified during the first review to make sure they have been corrected. Regardless of results, binders will ***only*** *be checked out for Repair once.*

D. Second Office Review Results

1 ☐ **Pass –** If all errors identified during the first Office Review were corrected. *The binder can be prepared for shipping.*

2 ☐ **Fail –** If any errors identified during the first Office Review were not corrected. *The binder can be prepared for shipping.*

U S CENSUS BUREAU

FORM **D-446 (UL)(PR)**
(11-4-2009)

U.S. DEPARTMENT OF COMMERCE
Economics and Statistics Administration
U.S. CENSUS BUREAU

OFFICE REVIEW CHECKLIST
OPERATION: UPDATE/LEAVE
2010 Census

1. RCC	
2. LCO	
3. CLD	
4. AA	
5. Total Units (D–105A + D–105B + D–105C)	

A. COMPLETENESS CHECK

1. *Verify the following materials are present:*

- D-451 (UL)(PR), Cubierta/Registro Diario para Actualización/Entega
- D-1190 (UL)(PR), Cotejo de Calidad Dependiente de Actualización/Entrega
- D-105A (UL)(PR), Página de Lista de Direcciones
- D-105B (UL)(PR), Página para Añadir Unidades de Vivienda
- D-105C (UL)(PR), Página para Añadir Otros Alojamientos

2. *Verify that Item (2e), 'Date Completed,' has an entry on the D-451 (UL)(PR), (Cubierta/Registro Diario par Actualización/Entega.)*

If any of the above materials are missing, Stop Office Review and contact the QC field staff for appropriate action. Otherwise, continue the Office Review.

B. ERROR CHECK – *Check every item as described below. Record one tally in either Column (2) or Column (3), as appropriate, for **each** error you encounter.*

Critical – Errors that cannot be corrected in the office and must be corrected by a QC Enumerator.

Noncritical – Errors that can be corrected in the office.

Error Descriptions (1)	Critical (2)	Noncritical (3)
Address Listing Page		
1. Action Code in Column (5a) is missing or invalid.		
2. Action Code does not have the following corresponding entries: **C –** Corrections are entered in Columns (6a) through (6p), (7), (8a), or (8b); information is added to Column (4) **D2 –** Line number of duplicate address is entered in Column (5b). **V, D1, N, U, and E –** No other entries required.		
3. Any one of the following address combinations is not complete and a location description is missing: • House Number (Column (6a)) and Street or Road Name (Column(6b)), or Carretera (Column (6k)) or Ramal (Column (6m)), or • House Number (Column (6a)) and Urbanization Name (Column (6b)), or • Condominium or Residential Name (Column (6b) and Unit Identifier (Column 6h))		
4. Map Spot Number (Column (4)) is blank (unless unit has a preprinted 'Z' in Column (5a)).		
Add Pages (Housing Units or Other Living Quarters)		
5. Any of the following required fields are not completed on the Add Pages: • Block Number (Item (1)) • Map Spot (Item (2)) • Processing ID (Item (3) – for Housing Units only) • ZIP Code (Item (4n))		
6. Any one of the following address combinations is not complete and a location description is missing: • House Number (Item (4a)) and Street or Road Name (Item (4h)) or Carretera (Item (4k)) or Ramal (Item (4m)), or • House Number (Item (4a)) and Urbanization Name (Item (4b)), or • Condominium or Residential Name (Item (4b)) and Unit Identifier (Item (6j))		
7. Non-city style mailing address (Item (6)), including ZIP Code (Item (6a)), is blank when an address combination listed in number 6 of this form is not complete.		
RCC, LCO, AA, State Code, County Code, and/or Page ____ of ____ are blank.		

Census Block Maps		
9. Entry on the Address Listing Page or Add Pages do not have a corresponding map spot and map spot number entered on the Block Map.		
10. Map spot is deleted on the Block Map without a corresponding deleted address on the Address Listing Page.		
11. Updated street/road name does not have corresponding updates reflected on the Address Listing Page and/or Add Pages, if there are units listed for the street/road.		
Legibility		
12. Entries are not legible on the Address Listing Page, Add Pages, or Block Maps and **cannot be fixed in the office.**		
13. Entries are not legible on the Address Listing Page, Add Pages, or Block Maps and **can be fixed in the office.**		
14. TOTAL ERRORS – *Sum of tally in Columns (2) and (3)* →		
15. Critical Error Rate – *Total of Column (2)/Total Units * 100)*		
Example: if the total of Column (2) is 5, and the Total Units is 50, the critical error rate is 5/50 = .1 → * 100 = 10%. →	%	

C. First Office Review Results

1 ☐ **Pass –** If Critical Error Rate is less than or equal to 5%. *The binder can be prepared for shipping.*

2 ☐ **Fail –** If Critical Error Rate is greater than 5%. *Check the binder out to QC field staff for Repair.*

*Any binder checked out to QC field staff for Repair must be reviewed again after the assignment is completed. Follow the instructions in Section A, 'Completeness Check.' Next, check the errors identified during the first review to make sure they have been corrected. Regardless of results, binders will **only** be checked out for Repair once.*

D. Second Office Review Results

1 ☐ **Pass –** If all errors identified during the first Office Review were corrected. *The binder can be prepared for shipping.*

2 ☐ **Fail –** If any errors identified during the first Office Review were not corrected. *The binder can be prepared for shipping.*

NOTES _____

U/L Observation Checklists shipped to HQ

Last Date shipped - 12/13/2010

280 total Update/Leave observation forms received at HQ
10 forms containing both Production and QC data
1 NRFU observation form received

Table H1: Production Observation Checklists Results

Results	Count	Percent
Satisfactory	124	99.20
Unsatisfactory	0	0.00
Other	1	0.80
All*	**125**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

*There were 76 observation forms excluded due to missing Observation Results information.

Table H2: QC Observation Checklists Results

Results	Count	Percent
Satisfactory	62	98.41
Unsatisfactory	0	0.00
Other	1	1.59
All*	**63**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

*There were 6 observation forms excluded due to missing Observation Results information.

Results of the Observation Checklists Removed from the Universe

Table I1: Results of the Initial Observation Forms with Mismatched Types (Production forms containing QC data and QC forms containing Production data)

	1st Observation		2nd Observation		Both	
Results	Count	Percent	Count	Percent	Count	Percent
Satisfactory	35	100.00	4	100.00	39	100.00
Unsatisfactory	0	0.00	0	0.00	0	0.00
Other	0	0.00	0	0.00	0	0.00
Total*	**35**	**100.00**	**4**	**100.00**	**39**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*There were 43 observation forms excluded due to missing Observation Results information.

Table I2: Results of the Initial Observation Forms with Both Types of Data

	1st Observation		2nd Observation		Both	
Results	Count	Percent	Count	Percent	Count	Percent
Satisfactory	242	97.98	48	97.26	290	97.97
Unsatisfactory	4	1.62	1	2.04	5	1.69
Other	1	0.40	0	0.00	1	0.03
Total*	**247**	**100.00**	**49**	**100.00**	**296**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*There were 58 observation forms excluded due to missing Observation Results information.

Table I3: Results of the Initial Observation Forms with No Type Indicated

Results	Count	Percent
Satisfactory	11	22.45
Unsatisfactory	4	8.16
Other	34	69.39
Total*	**49**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*There were 15 observation forms excluded due to missing Observation Results information.

Regional Census Center Names and Codes

Table: Regional Census Centers

Regional Census Center Name	Regional Census Center Code
Puerto Rico	2102
Boston, MA	2199
New York, NY	2299
Philadelphia, PA	2399
Detroit, MI	2499
Chicago, IL	2599
Kansas City, KS	2699
Seattle, WA	2799
Charlotte, NC	2899
Atlanta, GA	2999
Dallas, TX	3099
Denver, CO	3199
Los Angeles, CA	3299

Regional Census Center (RCC)-Level Enumerator and Observation Form Tables

Table K1a: Breakdown of Observation Checklists Removed from Analysis for Puerto Rico RCC

Number of Observation Checklists received:		5,966
Blank applicant ID:	72	
No type of observation indicated:	0	
Containing both Production and QC data:	49	
Production Enumerator exact duplicates:	0	
QC Enumerator exact duplicates:	0	
Production Enumerator remaining duplicates:	195	
QC Enumerator remaining duplicates:	10	
Total number of forms removed:		326
Resulting number of forms analyzed:		**5,640**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ
* For this table, and the tables that follow, the RCC-level data do not sum to the national-level data reported in the Update/Leave Quality Profile due to keying errors in the data forms and forms with unidentified RCC codes.

Table K1b: Breakdown of Observation Checklists Removed from Analysis for Boston RCC

Number of Observation Checklists received:		2,347
Blank applicant ID:	136	
No type of observation indicated:	2	
Containing both Production and QC data:	20	
Production Enumerator exact duplicates:	2	
QC Enumerator exact duplicates:	0	
Production Enumerator remaining duplicates:	38	
QC Enumerator remaining duplicates:	7	
Total number of forms removed:		205
Resulting number of forms analyzed:		**2,142**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K1c: Breakdown of Observation Checklists Removed from Analysis for New York RCC

Number of Observation Checklists received (file and hard copy):		11
Blank applicant ID:	0	
No type of observation indicated:	0	
Containing both Production and QC data:	2	
Production Enumerator exact duplicates:	0	
QC Enumerator exact duplicates:	0	
Production Enumerator remaining duplicates:	0	
QC Enumerator remaining duplicates:	0	
Total number of forms removed:		2
Resulting number of forms analyzed:		**9**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K1d: Breakdown of Observation Checklists Removed from Analysis for Philadelphia RCC

Number of Observation Checklists received (file and hard copy):		1,168
Blank applicant ID:	66	
No type of observation indicated:	0	
Containing both Production and QC data:	7	
Production Enumerator exact duplicates:	4	
QC Enumerator exact duplicates:	0	
Production Enumerator remaining duplicates:	22	
QC Enumerator remaining duplicates:	8	
Total number of forms removed:		107
Resulting number of forms analyzed:		**1,061**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K1e: Breakdown of Observation Checklists Removed from Analysis for Detroit RCC

Number of Observation Checklists received (file and hard copy):		1,131
Blank applicant ID:	59	
No type of observation indicated:	0	
Containing both Production and QC data:	17	
Production Enumerator exact duplicates:	0	
QC Enumerator exact duplicates:	0	
Production Enumerator remaining duplicates:	10	
QC Enumerator remaining duplicates:	4	
Total number of forms removed:		90
Resulting number of forms analyzed:		**1,041**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K1f: Breakdown of Observation Checklists Removed from Analysis for Chicago RCC

Number of Observation Checklists received (file and hard copy):		859
Blank applicant ID:	55	
No type of observation indicated:	0	
Containing both Production and QC data:	29	
Production Enumerator exact duplicates:	1	
QC Enumerator exact duplicates:	0	
Production Enumerator remaining duplicates:	14	
QC Enumerator remaining duplicates:	0	
Total number of forms removed:		99
Resulting number of forms analyzed:		**760**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K1g: Breakdown of Observation Checklists Removed from Analysis for Kansas City RCC

Number of Observation Checklists received (file and hard copy):		2,764
Blank applicant ID:	157	
No type of observation indicated:	14	
Containing both Production and QC data:	74	
Production Enumerator exact duplicates:	9	
QC Enumerator exact duplicates:	0	
Production Enumerator remaining duplicates:	40	
QC Enumerator remaining duplicates:	4	
Total number of forms removed:		298
Resulting number of forms analyzed:		**2,466**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K1h: Breakdown of Observation Checklists Removed from Analysis for Seattle RCC

Number of Observation Checklists received (file and hard copy):		1,371
Blank applicant ID:	81	
No type of observation indicated:	0	
Containing both Production and QC data:	21	
Production Enumerator exact duplicates:	84	
QC Enumerator exact duplicates:	50	
Production Enumerator remaining duplicates:	112	
QC Enumerator remaining duplicates:	64	
Total number of forms removed:		412
Resulting number of forms analyzed:		**959**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K1i: Breakdown of Observation Checklists Removed from Analysis for Charlotte RCC

Number of Observation Checklists received (file and hard copy):		623
Blank applicant ID:	33	
No type of observation indicated:	0	
Containing both Production and QC data:	16	
Production Enumerator exact duplicates:	1	
QC Enumerator exact duplicates:	0	
Production Enumerator remaining duplicates:	18	
QC Enumerator remaining duplicates:	1	
Total number of forms removed:		69
Resulting number of forms analyzed:		**554**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K1j: Breakdown of Observation Checklists Removed from Analysis for Atlanta RCC

Number of Observation Checklists received (file and hard copy):		928
Blank applicant ID:	57	
No type of observation indicated:	7	
Containing both Production and QC data:	47	
Production Enumerator exact duplicates:	0	
QC Enumerator exact duplicates:	1	
Production Enumerator remaining duplicates:	5	
QC Enumerator remaining duplicates:	2	
Total number of forms removed:		119
Resulting number of forms analyzed:		**809**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K1k: Breakdown of Observation Checklists Removed from Analysis for Dallas RCC

Number of Observation Checklists received (file and hard copy):		2,829
Blank applicant ID:	135	
No type of observation indicated:	5	
Containing both Production and QC data:	47	
Production Enumerator exact duplicates:	121	
QC Enumerator exact duplicates:	28	
Production Enumerator remaining duplicates:	207	
QC Enumerator remaining duplicates:	51	
Total number of forms removed:		594
Resulting number of forms analyzed:		**2,235**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K1l: Breakdown of Observation Checklists Removed from Analysis for Denver RCC

Number of Observation Checklists received (file and hard copy):		5,039
Blank applicant ID:	254	
No type of observation indicated:	2	
Containing both Production and QC data:	61	
Production Enumerator exact duplicates:	104	
QC Enumerator exact duplicates:	28	
Production Enumerator remaining duplicates:	267	
QC Enumerator remaining duplicates:	41	
Total number of forms removed:		757
Resulting number of forms analyzed:		**4,282**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K1m: Breakdown of Observation Checklists Removed from Analysis for Los Angeles RCC

Number of Observation Checklists received (file and hard copy):		797
Blank applicant ID:	33	
No type of observation indicated:	0	
Containing both Production and QC data:	18	
Production Enumerator exact duplicates:	1	
QC Enumerator exact duplicates:	0	
Production Enumerator remaining duplicates:	9	
QC Enumerator remaining duplicates:	0	
Total number of forms removed:		61
Resulting number of forms analyzed:		**736**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms and hard copy forms received at HQ

Table K2: Production Enumerator and QC Enumerator Counts by RCC from Paper-Based Operations Control System

	Production		QC	
RCC	**Count**	**Percent**	**Count**	**Percent**
Puerto Rico	5,716	13.51	1,254	13.00
Boston	2,907	6.87	703	7.29
New York	17	0.04	6	0.06
Philadelphia	1,594	3.77	335	3.47
Detroit	3,201	7.56	689	7.15
Chicago	1,383	3.27	319	3.31
Kansas City	8,697	20.55	1,737	18.01
Seattle	1,918	4.53	453	4.70
Charlotte	818	1.93	228	2.36
Atlanta	2,424	5.73	582	6.04
Dallas	6,033	14.26	1,340	13.90
Denver	6,710	15.86	1,756	18.21
Los Angeles	903	2.13	241	2.50
All	**42,321**	**100.00**	**9,643**	**100.00**

Data Source: PBOCS DQC file

Table K3: Production Enumerator and QC Enumerator Counts by RCC from Paper-Based Operations Control System

RCC	Production			QC		
	No. of Enumerators	No. Checklists	%	No. of Enumerators	No. Checklists	%
Puerto Rico	5,716	4,813	84.20	1,254	827	65.95
Boston	2,907	1,724	59.31	703	418	59.46
New York	17	8	47.06	6	1	16.67
Philadelphia	1,594	850	53.32	335	211	62.99
Detroit	3,201	786	24.55	689	255	37.01
Chicago	1,383	647	46.78	319	113	35.42
Kansas City	8,697	1,953	22.46	1,737	513	29.53
Seattle	1,918	757	39.47	453	202	44.59
Charlotte	818	448	54.77	228	106	46.49
Atlanta	2,424	638	26.32	582	171	29.38
Dallas	6,033	1,763	29.22	1,340	472	35.22
Denver	6,710	3,553	52.95	1,756	729	41.51
Los Angeles	903	596	66.00	241	140	58.09
All	**42,321**	**18,536**	**43.80**	**9,643**	**4,158**	**43.12**

Data Source: PBOCS DQC file

Table K4: Unique Enumerators by RCC from Paper-Based Operations Control System

RCC	Count	Percent
Puerto Rico	6,948	13.57
Boston	3,531	6.90
New York	23	0.04
Philadelphia	1,901	3.71
Detroit	3,863	7.54
Chicago	1,698	3.32
Kansas City	10,362	20.24
Seattle	2,353	4.60
Charlotte	1,007	1.97
Atlanta	2,903	5.67
Dallas	7,256	14.17
Denver	8,214	16.04
Los Angeles	1,141	2.23
All	**51,200**	**100.00**

Data Source: PBOCS DQC file

Table K5: Production Enumerators with 1st and 2nd Observations by RCC

	1st Observation		2nd Observation		Both Observations	
RCC	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Puerto Rico	4,113	23.92	700	52.16	4,813	25.97
Boston	1,650	9.60	74	5.51	1,724	9.30
New York	8	0.05	0	0.00	8	0.04
Philadelphia	793	4.61	57	4.25	850	4.59
Detroit	766	4.46	20	1.49	786	4.24
Chicago	612	3.56	35	2.61	647	3.49
Kansas City	1,885	10.96	68	5.07	1,953	10.54
Seattle	739	4.30	18	1.34	757	4.08
Charlotte	431	2.51	17	1.27	448	2.42
Atlanta	610	3.55	28	2.09	638	3.44
Dallas	1,665	9.68	98	7.30	1,763	9.51
Denver	3,354	19.51	199	14.83	3,553	19.17
Los Angeles	568	3.30	28	2.09	596	3.22
All	**17,194**	**100.00**	**1,342**	**100.00**	**18,536**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

Table K6: QC Enumerators with 1st and 2nd Observations by RCC

	1st Observation		2nd Observation		Both Observations	
RCC	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Puerto Rico	743	18.81	84	40.19	827	19.89
Boston	396	10.03	22	10.53	418	10.05
New York	1	0.03	0	0.00	1	0.02
Philadelphia	200	5.06	11	5.26	211	5.07
Detroit	250	6.33	5	2.39	255	6.13
Chicago	109	2.76	4	1.91	113	2.72
Kansas City	495	12.53	18	8.61	513	12.34
Seattle	195	4.94	7	3.35	202	4.86
Charlotte	102	2.58	4	1.91	106	2.55
Atlanta	168	4.25	3	1.44	171	4.11
Dallas	455	11.52	17	8.13	472	11.35
Denver	702	17.78	27	12.92	729	17.53
Los Angeles	133	3.37	7	3.35	140	3.37
All	**3,949**	**100.00**	**209**	**100.00**	**4,158**	**100.00**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

Table K7: Results of Production Enumerator Initial Observations by RCC

	Results (Count and Percent by RCC)			
RCC	**Satisfactory**	**Unsatisfactory**	**Other**	**All Observations**
Puerto Rico	4,151 (97.30%)	72 (1.69%)	43 (1.01%)	**4,266 (100.00%)**
Boston	1,380 (97.11%)	28 (1.97%)	13 (0.91%)	**1,421(100.00%)**
New York	7 (100.00%)	0 (0.00%)	0 (0.00%)	**7 (100.00%)**
Philadelphia	625 (97.05%)	10 (1.55%)	9 (1.40%)	**644 (100.00%)**
Detroit	629 (97.67%)	7 (1.09%)	8 (1.24%)	**644 (100.00%)**
Chicago	395 (98.26%)	4 (1.00%)	3 (0.75%)	**402 (100.00%)**
Kansas City	1,389 (99.07%)	9 (0.64%)	4 (0.29%)	**1,402 (100.00%)**
Seattle	604 (97.73%)	10 (1.62%)	4 (0.65%)	**618 (100.00%)**
Charlotte	369 (97.11%)	8 (2.11%)	3 (0.79%)	**380 (100.00%)**
Atlanta	472 (95.35%)	11 (2.22%)	12 (2.42%)	**495 (100.00%)**
Dallas	1,176 (96.71%)	34 (2.80%)	6 (0.49%)	**1,216 (100.00%)**
Denver	2,375 (96.19%)	34 (1.38%)	60 (2.43%)	**2,469 (100.00%)**
Los Angeles	386 (96.26%)	8 (2.00%)	7 (1.75%)	**401 (100.00%)**
All	**13,958 (97.17%)**	**235 (1.64%)**	**172 (1.20%)**	**14,365 (100.00%)**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*"Other" represents Enumerators who resigned or were terminated prior to the observation.

Table K8: Results of QC Enumerator Initial Observations by RCC

	Results (Count and Percent by RCC)			
RCC	**Satisfactory**	**Unsatisfactory**	**Other***	**All Observations**
Puerto Rico	794 (98.51%)	10 (1.24%)	2 (0.25%)	**806 (100.00%)**
Boston	381 (99.74%)	1 (0.26%)	0 (0.00%)	**382 (100.00%)**
New York	0 (0.00%)	0 (0.00%)	0 (0.00%)	**0 (100.00%)**
Philadelphia	178 (99.44%)	0 (0.00%)	1 (0.56%)	**179 (100.00%)**
Detroit	222 (100.00%)	0 (0.00%)	0 (0.00%)	**221 (100.00%)**
Chicago	97 (97.00%)	0 (0.00%)	3 (3.00%)	**100 (100.00%)**
Kansas City	447 (98.68%)	5 (1.10%)	1 (0.22%)	**453 (100.00%)**
Seattle	178 (98.34%)	2 (1.10%)	1 (0.55%)	**181 (100.00%)**
Charlotte	96 (96.00%)	3 (3.00%)	1 (1.00%)	**100 (100.00%)**
Atlanta	144 (99.31%)	1 (0.69%)	0 (0.00%)	**145 (100.00%)**
Dallas	421 (94.61%)	9 (2.02%)	15 (3.37%)	**445 (100.00%)**
Denver	636 (98.60%)	5 (0.78%)	4 (0.62%)	**645 (100.00%)**
Los Angeles	114 (100.00%)	0 (0.00%)	0 (0.00%)	**114 (100.00%)**
All	**3,708 (98.30%)**	**36 (0.95%)**	**28 (0.74%)**	**3,772 (100.00%)**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*"Other" represents Enumerators who resigned or were terminated prior to the observation.

Table K9: Results of Production Enumerator 1st Observations by RCC

	Results (Count and Percent by RCC)			
RCC	**Satisfactory**	**Unsatisfactory**	**Other***	**All Observations**
Puerto Rico	3,579 (97.60%)	50 (1.36%)	38 (1.04%)	**3,667 (100.00%)**
Boston	1,335 (97.30%)	24 (1.75%)	13 (0.95%)	**1,372 (100.00%)**
New York	7 (100.00%)	0 (0.00%)	0 (0.00%)	**7 (100.00%)**
Philadelphia	585 (97.34%)	8 (1.33%)	8 (1.33%)	**601 (100.00%)**
Detroit	613 (97.77%)	6 (0.96%)	8 (1.28%)	**627 (100.00%)**
Chicago	374 (98.94%)	2 (0.53%)	2 (0.53%)	**378 (100.00%)**
Kansas City	1,339 (99.11%)	8 (0.59%)	4 (0.30%)	**1,351 (100.00%)**
Seattle	593 (98.02%)	8 (1.32%)	4 (0.66%)	**605 (100.00%)**
Charlotte	358 (98.08%)	4 (1.10%)	3 (0.82%)	**365 (100.00%)**
Atlanta	450 (95.34%)	10 (2.12%)	12 (2.54%)	**472 (100.00%)**
Dallas	1,113 (97.21%)	26 (2.27%)	6 (0.52%)	**1,145 (100.00%)**
Denver	2,270 (96.23%)	30 (1.27%)	59 (2.50%)	**2,359 (100.00%)**
Los Angeles	375 (96.90%)	6 (1.55%)	6 (1.55%)	**387 (100.00%)**
All	**12,991 (97.41%)**	**182 (1.363%)**	**163 (1.22%)**	**13,336 (100.00%)**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*"Other" represents Enumerators who resigned or were terminated prior to the observation.

Table K10: Results of Production Enumerator 2nd Observations by RCC

	Results (Count and Percent by RCC)			
RCC	**Satisfactory**	**Unsatisfactory**	**Other***	**All Observations**
Puerto Rico	572 (95.49%)	22 (3.67%)	5 (0.83%)	**599 (100.00%)**
Boston	45 (91.84%)	4 (8.16%)	0 (0.00%)	**49 (100.00%)**
New York	0 (0.00%)	0 (0.00%)	0 (0.00%)	**0 (100.00%)**
Philadelphia	40 (93.02%)	2 (4.65%)	1 (2.33%)	**43 (100.00%)**
Detroit	16 (94.12%)	1 (5.88%)	0 (0.00%)	**17 (100.00%)**
Chicago	21 (87.50%)	2 (8.33%)	1 (4.17%)	**24 (100.00%)**
Kansas City	50 (98.04%)	1 (1.96%)	0 (0.00%)	**51 (100.00%)**
Seattle	11 (84.62%)	2 (15.38%)	0 (0.00%)	**13 (100.00%)**
Charlotte	11 (73.33%)	4 (26.67%)	0 (0.00%)	**15 (100.00%)**
Atlanta	22 (95.65%)	1 (4.35%)	0 (0.00%)	**23 (100.00%)**
Dallas	63 (88.73%)	8 (11.27%)	0 (0.00%)	**71 (100.00%)**
Denver	105 (95.45%)	4 (3.64%)	1 (0.91%)	**110 (100.00%)**
Los Angeles	11 (78.57%)	2 (14.29%)	1 (7.14%)	**14 (100.00%)**
All	**967 (93.97%)**	**53 (5.15%)**	**9 (0.87%)**	**1,029 (100.00%)**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*"Other" represents Enumerators who resigned or were terminated prior to the observation.

Table K11: Results of QC Enumerator 1st Observations by RCC

	Results (Count and Percent by RCC)			
RCC	**Satisfactory**	**Unsatisfactory**	**Other***	**All Observations**
Puerto Rico	716 (98.76%)	7 (0.97%)	2 (0.28%)	**725 (100.00%)**
Boston	362 (99.72%)	1 (0.28%)	0 (0.00%)	**363 (100.00%)**
New York	0 (0.00%)	0 (0.00%)	0 (0.00%)	**0 (100.00%)**
Philadelphia	171 (99.42%)	0 (0.00%)	1 (0.58%)	**172 (100.00%)**
Detroit	218 (100.00%)	0 (0.00%)	0 (0.00%)	**218 (100.00%)**
Chicago	93 (96.88%)	0 (0.00%)	3 (3.13%)	**96 (100.00%)**
Kansas City	429 (98.62%)	5 (1.15%)	1 (0.23%)	**435 (100.00%)**
Seattle	171 (98.28%)	2 (1.15%)	1 (0.57%)	**174 (100.00%)**
Charlotte	93 (96.88%)	2 (2.08%)	1 (1.04%)	**96 (100.00%)**
Atlanta	142 (99.30%)	1 (0.70%)	0 (0.00%)	**143 (100.00%)**
Dallas	407 (94.87%)	7 (1.63%)	15 (3.50%)	**429 (100.00%)**
Denver	613 (98.71%)	4 (0.64%)	4 (0.64%)	**621 (100.00%)**
Los Angeles	107 (100.00%)	0 (0.00%)	0 (0.00%)	**107 (100.00%)**
All	**3,522 (98.41%)**	**29 (0.81%)**	**28 (0.78%)**	**3,579 (100.00%)**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

*"Other" represents Enumerators who resigned or were terminated prior to the observation.

Table K12: Results of QC Enumerator 2nd Observations by RCC

	Results (Count and Percent by RCC)			
RCC	**Satisfactory**	**Unsatisfactory**	**Other***	**Total**
Puerto Rico	78 (96.30%)	3 (3.70%)	0 (0.00%)	**81 (100.00%)**
Boston	19 (100.00%)	0 (0.00%)	0 (0.00%)	**19 (100.00%)**
New York	0 (0.00%)	0 (0.00%)	0 (0.00%)	**0 (100.00%)**
Philadelphia	7 (100.00%)	0 (0.00%)	0 (0.00%)	**7 (100.00%)**
Detroit	4 (100.00%)	0 (0.00%)	0 (0.00%)	**4 (100.00%)**
Chicago	4 (100.00%)	0 (0.00%)	0 (0.00%)	**4 (100.00%)**
Kansas City	18 (100.00%)	0 (0.00%)	0 (0.00%)	**18 (100.00%)**
Seattle	7 (100.00%)	0 (0.00%)	0 (0.00%)	**7 (100.00%)**
Charlotte	3 (75.00%)	1 (25.00%)	0 (0.00%)	**4 (100.00%)**
Atlanta	2 (100.00%)	0 (0.00%)	0 (0.00%)	**2 (100.00%)**
Dallas	14 (87.50%)	2 (12.50%)	0 (0.00%)	**16 (100.00%)**
Denver	23 (95.83%)	1 (4.17%)	0 (0.00%)	**24 (100.00%)**
Los Angeles	7 (100.00%)	0 (0.00%)	0 (0.00%)	**7 (100.00%)**
All	**186 (96.37%)**	**7 (3.63%)**	**0 (0.00%)**	**193 (100.00%)**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

*"Other" represents Enumerators who resigned or were terminated prior to the observation.

Table K13: Tasks Production Enumerators Failed/Performed Incorrectly during the 1st Observation, by RCC

Errors Committed (Count of forms failing tasks in each RCC)													
	RCC												
Errors	**Boston**	**New York**	**Philadelphia**	**Detroit**	**Chicago**	**Kansas City**	**Seattle**	**Charlotte**	**Atlanta**	**Dallas**	**Denver**	**Los Angeles**	**Puerto Rico**
Canvassed in correct block	19	0	18	4	5	14	6	3	9	23	35	6	131
Checked for living quarters/canvassed to the right	20	0	11	9	10	20	11	4	14	38	41	6	69
Interviewed/attempted to interview at all structures	19	0	6	5	5	15	1	2	5	32	28	2	44
Contacted knowledgeable person at all structures	26	0	14	11	12	35	4	6	10	39	79	11	58
Showed Census ID and Confidentiality Notice	43	0	27	17	18	29	24	7	12	61	92	14	90
Entered Correct Action Code	46	0	28	10	9	33	10	8	15	56	57	14	229
Entered Correct Duplicate Unit Code	22	0	20	7	5	25	7	3	8	29	43	6	142
Correctly added missing map spot	24	0	10	10	2	23	11	7	20	43	45	12	199
Added missing house number	23	0	7	3	2	17	5	4	8	27	29	7	77
Made appropriate updates on Address Listing Pages	21	0	12	6	6	29	9	4	9	31	37	10	105
Entered location description for units missing house number	16	0	11	4	6	26	6	5	6	36	40	5	107
Correctly added missing units	24	0	11	6	6	22	10	3	12	32	37	13	92
Verified maps matched listing pages	32	0	25	12	12	34	14	9	10	54	60	8	150
Verified/corrected map spot location	30	0	26	13	7	25	11	5	11	50	55	7	136
Correctly add/delete map spot	32	0	26	11	5	30	17	8	20	44	56	21	157
Correctly updated street features	21	0	22	13	7	22	16	7	16	24	46	11	100
Geocodes on questionnaire label matched listing page	42	0	28	9	10	39	19	4	14	60	69	17	148
Correctly copied processing ID to the Add Page	31	0	27	13	15	37	8	1	10	50	64	18	102
Corrected the label to match changes made on listing pages	25	0	30	7	12	46	12	4	7	30	40	9	125
Entered code for undeliverable questionnaires	14	0	7	4	6	24	4	2	7	30	36	5	88

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

*The errors will not sum to the total of Production Enumerator observation forms. This table includes the forms excluded from the results table.

Table K14: Tasks Production Enumerators Failed/Performed Incorrectly during the 2nd Observation, by RCC

Errors Committed (Count of forms failing tasks in each RCC)													
	RCC												
Errors	**Boston**	**New York**	**Philadelphia**	**Detroit**	**Chicago**	**Kansas City**	**Seattle**	**Charlotte**	**Atlanta**	**Dallas**	**Denver**	**Los Angeles**	**Puerto Rico**
Canvassed in correct block	1	0	1	1	0	2	1	1	0	0	6	0	13
Checked for living quarters/canvassed to the right	2	0	3	1	1	1	1	1	0	4	3	1	13
Interviewed/attempted to interview at all structures	1	0	0	0	0	0	0	1	0	4	3	2	6
Contacted knowledgeable person at all structures	1	0	2	0	0	0	0	0	1	3	10	1	9
Showed Census ID and Confidentiality Notice	2	0	0	0	1	0	1	0	1	1	5	1	7
Entered Correct Action Code	2	0	2	2	1	1	0	1	2	9	6	2	19
Entered Correct Duplicate Unit Code	2	0	1	0	0	1	1	1	2	1	7	2	15
Correctly added missing map spot	1	0	2	0	0	0	2	1	2	7	3	0	29
Added missing house number	2	0	1	0	0	2	0	0	0	2	2	0	15
Made appropriate updates on Address Listing Pages	2	0	1	0	0	3	0	0	0	3	5	2	22
Entered location description for units missing house number	1	0	2	0	1	3	0	1	0	1	3	1	11
Correctly added missing units	1	0	1	0	0	1	1	0	0	5	5	2	11
Verified maps matched listing pages	4	0	3	1	0	1	1	0	0	5	4	2	22
Verified/corrected map spot location	3	0	2	1	0	1	1	0	0	4	7	2	18
Correctly add/delete map spot	1	0	6	1	0	1	3	0	1	6	7	3	22
Correctly updated street features	2	0	1	1	1	1	1	0	1	3	5	1	12
Geocodes on questionnaire label matched listing page	3	0	0	0	0	1	0	0	1	6	4	0	19
Correctly copied processing ID to the Add Page	2	0	3	0	0	0	1	0	0	4	6	1	13
Corrected the label to match changes made on listing pages	2	0	1	0	0	1	0	0	1	2	4	3	16
Entered code for undeliverable questionnaires	1	0	0	0	0	1	1	0	1	2	5	0	10

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

*The errors will not sum to the total of Production Enumerator observation forms. This table includes the forms excluded from the results table.

Table K15: Tasks QC Enumerators Failed/Performed Incorrectly during the 1st Observation, by RCC

Errors Committed (Count of forms failing tasks in each RCC)													
	RCC												
Errors	**Boston**	**New York**	**Philadelphia**	**Detroit**	**Chicago**	**Kansas City**	**Seattle**	**Charlotte**	**Atlanta**	**Dallas**	**Denver**	**Los Angeles**	**Puerto Rico**
Canvassed in correct block	0	0	4	4	0	13	5	1	4	7	9	1	25
Checked for living quarters/canvassed to the right	2	0	0	3	0	7	2	2	2	6	13	0	15
Interviewed/attempted to interview at all structures	1	0	2	1	0	1	1	1	0	6	5	0	13
Contacted knowledgeable person at all structures	0	0	2	0	0	2	1	0	1	1	3	0	13
Showed Census ID and Confidentiality Notice	1	0	2	1	0	2	0	0	0	7	4	0	17
Entered Correct Action Code	4	0	1	1	0	7	3	0	1	8	5	0	11
Entered Correct Duplicate Unit Code	0	0	0	0	1	5	2	2	1	5	3	0	9
Correctly added missing map spot	1	0	0	0	0	4	4	1	1	5	29	0	5
Added missing house number	10	0	2	2	2	4	6	3	2	19	17	1	16
Made appropriate updates on Address Listing Pages	3	0	1	0	1	2	1	3	3	3	25	0	5
Entered location description for units missing house number	1	0	0	0	0	5	0	1	5	4	23	0	8
Correctly added missing units	1	0	1	1	0	2	1	0	2	3	23	0	1
Verified maps matched listing pages	0	0	1	0	0	4	0	1	0	6	10	0	9
Verified/corrected map spot location	1	0	0	0	0	2	0	0	1	1	14	0	5
Correctly add/delete map spot	0	0	1	0	0	4	0	0	2	3	20	0	3
Correctly updated street features	0	0	2	2	0	9	0	1	2	10	10	0	15
Geocodes on questionnaire label matched listing page	1	0	1	1	0	4	1	2	1	7	10	1	14
Correctly copied processing ID to the Add Page	0	0	2	1	0	5	2	1	0	4	18	0	14
Corrected the label to match changes made on listing pages	1	0	1	1	0	2	1	1	1	4	23	0	17
Entered code for undeliverable questionnaires	0	0	0	0	0	0	0	1	3	3	20	0	1

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

*The errors will not sum to the total of Production Enumerator observation forms. This table includes the forms excluded from the results table.

Table K16: Tasks QC Enumerators Failed/Performed Incorrectly during the 2nd Observation, by RCC

Errors Committed (Count of forms failing tasks in each RCC)													
	RCC												
Errors	**Boston**	**New York**	**Philadelphia**	**Detroit**	**Chicago**	**Kansas City**	**Seattle**	**Charlotte**	**Atlanta**	**Dallas**	**Denver**	**Los Angeles**	**Puerto Rico**
Canvassed in correct block	0	0	0	0	0	0	1	0	0	1	1	0	1
Checked for living quarters/canvassed to the right	0	0	0	0	0	0	0	0	0	1	1	0	2
Interviewed/attempted to interview at all structures	0	0	0	0	0	0	0	0	0	1	0	0	1
Contacted knowledgeable person at all structures	0	0	0	0	0	0	0	0	0	1	0	0	1
Showed Census ID and Confidentiality Notice	0	0	0	0	0	0	0	0	0	0	1	0	6
Entered Correct Action Code	0	0	0	0	0	0	0	0	0	2	1	0	2
Entered Correct Duplicate Unit Code	0	0	0	0	0	0	0	0	0	1	0	0	3
Correctly added missing map spot	1	0	0	0	0	0	0	0	0	0	0	0	3
Added missing house number	0	0	0	0	0	0	0	0	0	1	0	0	2
Made appropriate updates on Address Listing Pages	0	0	0	0	0	1	0	0	0	1	1	0	0
Entered location description for units missing house number	0	0	0	0	0	1	0	0	0	1	1	0	2
Correctly added missing units	0	0	0	0	0	0	0	0	0	0	0	0	1
Verified maps matched listing pages	0	0	0	0	0	0	0	0	0	0	1	0	1
Verified/corrected map spot location	0	0	0	0	0	0	0	0	0	0	0	0	1
Correctly add/delete map spot	0	0	0	0	0	0	0	0	0	0	0	0	2
Correctly updated street features	4	0	0	0	0	0	0	0	0	0	0	0	1
Geocodes on questionnaire label matched listing page	2	0	1	0	0	0	0	0	0	0	0	0	1
Correctly copied processing ID to the Add Page	2	0	0	0	0	0	0	0	0	0	0	0	2
Corrected the label to match changes made on listing pages	2	0	1	0	0	0	0	0	0	0	0	0	2
Entered code for undeliverable questionnaires	0	0	0	0	0	1	0	0	0	0	0	0	0

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

*The errors will not sum to the total of Production Enumerator observation forms. This table includes the forms excluded from the results table.

Table K17: Number of Addresses Observed for Production Enumerators by RCC

RCC	1st Observation			2nd Observation		
	Observed less than 10 addresses	Observed 10 or more addresses	Total	Observed less than 10 addresses	Observed 10 or more addresses	Total
Puerto Rico	2,446	2,317	4,763	370	303	673
Boston	544	1,051	1,595	45	21	66
New York	0	8	8	0	0	0
Philadelphia	222	567	789	18	34	52
Detroit	248	485	733	12	3	15
Chicago	258	340	598	20	5	25
Kansas City	629	1,184	1,813	16	27	43
Seattle	238	468	706	2	9	11
Charlotte	138	262	400	2	10	12
Atlanta	161	412	573	1	16	17
Dallas	513	1,130	1,643	45	46	91
Denver	1,302	1,876	3,178	87	64	151
Los Angeles	300	260	560	13	13	26
All	**6,999**	**10,360**	**17,359**	**631**	**551**	**1,182**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

Table K18: Number of Addresses Observed for QC Enumerators by RCC

RCC	1st Observation			2nd Observation		
	Observed less than 10 addresses	Observed 10 or more addresses	Total	Observed less than 10 addresses	Observed 10 or more addresses	Total
Puerto Rico	678	132	810	49	34	83
Boston	357	36	393	18	1	19
New York	0	1	1	0	0	0
Philadelphia	177	13	190	7	2	9
Detroit	199	38	237	4	0	4
Chicago	86	12	98	2	0	2
Kansas City	438	35	473	10	1	11
Seattle	145	41	186	5	1	6
Charlotte	81	9	90	4	0	4
Atlanta	137	31	168	0	2	2
Dallas	417	29	446	12	4	16
Denver	586	63	649	17	3	20
Los Angeles	125	3	128	1	0	1
All	**3,426**	**443**	**3,869**	**129**	**48**	**177**

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms

Table K19: Observation Number Statistics from 1st Observation Production Enumerator forms by RCC

RCC	Number of Forms	Average Number of Units	Standard Deviation	Minimum
Puerto Rico	4,763	8.87	6.32	0
Boston	1,595	10.11	4.56	0
New York	8	12.88	2.53	10
Philadelphia	789	10.52	5.18	0
Detroit	733	9.72	5.62	0
Chicago	598	9.07	5.94	1
Kansas City	1,813	9.99	5.87	0
Seattle	706	10.19	4.86	0
Charlotte	400	10.39	5.36	0
Atlanta	573	10.57	5.76	0
Dallas	1,642	10.82	6.37	0
Denver	3,178	9.54	5.80	0
Los Angeles	560	9.15	6.45	0

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
* The maximum number of addresses observed was limited to less than 100.

Table K20: Observation Number Statistics from 2nd Observation Production Enumerator forms by RCC

RCC	Number of Forms	Average Number of Units	Standard Deviation	Minimum
Puerto Rico	673	9.52	9.14	1
Boston	66	7.41	6.63	0
New York	0	0	0.00	0
Philadelphia	52	11.10	7.17	3
Detroit	15	7.07	3.51	3
Chicago	25	4.76	4.94	1
Kansas City	43	10.56	8.42	2
Seattle	11	13.64	5.50	9
Charlotte	12	12.17	6.15	2
Atlanta	17	11.35	5.23	2
Dallas	91	9.54	7.96	1
Denver	151	10.64	10.22	1
Los Angeles	26	10.81	7.09	3

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*The maximum number of addresses observed was limited to less than 100.

Table K21: Observation Number Statistics from 1st Observation QC Enumerator forms by RCC

RCC	Number of Forms	Average Number of Units	Standard Deviation	Minimum
Puerto Rico	810	6.06	7.10	0
Boston	393	4.96	4.18	0
New York	1	19.00	n/a†	19
Philadelphia	190	5.13	2.49	1
Detroit	237	5.77	4.20	1
Chicago	98	5.19	4.26	1
Kansas City	473	5.13	5.26	0
Seattle	186	6.66	6.18	0
Charlotte	90	5.37	6.18	1
Atlanta	168	6.01	4.10	1
Dallas	446	5.53	7.53	0
Denver	649	4.99	3.91	0
Los Angeles	128	3.55	2.26	0

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*The maximum number of addresses observed was limited to less than 100.
† "N/A" stands for not applicable, since there was only one form included in the statistic.

Table K22: Observation Number Statistics from 2nd Observation QC Enumerator forms by RCC

RCC	Number of Forms	Average Number of Units	Standard Deviation	Minimum
Puerto Rico	83	0.82	10.62	1
Boston	19	4.26	1.69	2
New York	0	0	0.00	0
Philadelphia	9	5.56	3.00	1
Detroit	4	4.50	1.00	3
Chicago	2	5.00	0.00	5.00
Kansas City	11	4.55	2.46	2
Seattle	6	6.83	6.85	1
Charlotte	4	3.25	0.50	3
Atlanta	2	12.50	3.54	10
Dallas	16	7.50	5.98	2
Denver	20	7.80	8.56	3
Los Angeles	1	1.00	n/a †	1.00

Data Source: NPC keyed data file of Update/Leave Initial Observation Forms
*The maximum number of addresses observed was limited to less than 100.
† "N/A" stands for not applicable, since there was only one form included in the statistic.

Regional Census Center (RCC)-Level Enumerator and DQC Form Tables

Table L1: Comparison of Production and QC Enumerator Counts by Data Source by RCC

RCC	Type	PBOCS	NPC
Puerto Rico	Production Enumerators	5,716	5,792
	QC Enumerators	1,254	1,648
	Both Types	22	36
	All Enumerators	**6,970**	**7,440**
Boston	Production Enumerators	2,907	3,012
	QC Enumerators	703	961
	Both Types	79	85
	All Enumerators	**3,610**	**3,973**
New York	Production Enumerators	17	18
	QC Enumerators	6	11
	Both Types	0	1
	All Enumerators	**23**	**29**
Philadelphia	Production Enumerators	1,594	1,645
	QC Enumerators	335	513
	Both Types	28	37
	All Enumerators	**1,929**	**2,158**
Detroit	Production Enumerators	3,201	3,286
	QC Enumerators	689	1,054
	Both Types	27	108
	All Enumerators	**3,890**	**4,340**
Chicago	Production Enumerators	1,383	1,422
	QC Enumerators	319	451
	Both Types	4	6
	All Enumerators	**1,702**	**1,873**
Kansas City	Production Enumerators	8,657	8,924
	QC Enumerators	1,737	2,816
	Both Types	72	210
	All Enumerators	**10,434**	**11,740**
Seattle	Production Enumerators	1,918	1,977
	QC Enumerators	453	662
	Both Types	18	30
	All Enumerators	**2,371**	**2,639**
Charlotte	Production Enumerators	818	817
	QC Enumerators	228	294
	Both Types	39	59
	All Enumerators	**1,046**	**1,111**
Atlanta	Production Enumerators	2,424	2,458
	QC Enumerators	582	761
	Both Types	103	114
	All Enumerators	**3,006**	**3,219**
Dallas	Production Enumerators	6,033	6,031
	QC Enumerators	1,340	1,965
	Both Types	117	138
	All Enumerators	**7,373**	**7,996**
Denver	Production Enumerators	6,710	6,917
	QC Enumerators	1,756	2,754
	Both Types	252	310
	All Enumerators	**8,466**	**9,671**
Los Angeles	Production Enumerators	903	923
	QC Enumerators	241	321
	Both Types	3	4
	All Enumerators	**1,144**	**1,244**

Data Source: PBOCS DQC file and NPC keyed data file of the DQC Forms

Table L2: Total units in U/L by RCC

	Data Sources					
RCC	Enumeration File	PBOCS	NPC	Adjusted NPC	Combination	MAF
Puerto Rico	1,582,747	1,782,467	6,871,839	1,699,330	1,708,086	1,699,298
Boston	784,493	889,043	5,060,971	794,737	822,824	814,654
New York	4,776	5,249	4,502	4,502	5,016	5,005
Philadelphia	415,716	463,558	1,178,484	414,847	437,388	433,850
Detroit	895,299	999,503	5,938,819	894,867	939,405	929,668
Chicago	386,688	424,286	2,592,659	371,355	403,234	400,080
Kansas City	2,542,365	2,863,604	13,809,282	2,502,851	2,650,488	2,624,955
Seattle	566,575	710,984	3,221,373	576,595	602,186	594,563
Charlotte	198,085	226,217	190,016	190,016	209,777	207,461
Atlanta	608,873	733,099	3,895,292	595,288	649,893	640,207
Dallas	1,870,392	2,208,434	9,617,885	1,850,189	1,977,048	1,960,393
Denver	1,871,232	2,265,985	11,102,527	1,887,043	1,965,161	1,942,522
Los Angeles	254,885	300,627	2,428,863	263,137	276,240	269,333

*NPC source values due not to sum to National-level values reported in the report, since RCC code is not completed for all DQC forms.

Table L3: DQC Workload by RCC

	PBOCS		Adjusted NPC		Combination	
RCC	Count	Percent	Count	Percent	Count	Percent
Puerto Rico	125,353	7.03%	120,509	7.09%	125,353	7.34%
Boston	64,598	7.27%	61,959	7.80%	64,598	7.85%
New York	390	7.43%	376	8.35%	390	7.78%
Philadelphia	33,179	7.16%	32,024	7.72%	33,179	7.59%
Detroit	70,646	7.07%	69,007	7.71%	70,646	7.52%
Chicago	32,614	7.69%	31,447	8.47%	32,614	8.09%
Kansas City	203,781	7.12%	197,724	7.90%	203,781	7.69%
Seattle	47,691	6.71%	45,786	7.94%	47,691	7.92%
Charlotte	16,952	7.49%	16,246	8.55%	16,952	8.08%
Atlanta	50,200	6.85%	47,138	7.92%	50,200	7.72%
Dallas	157,766	7.14%	146,863	7.94%	157,766	7.98%
Denver	173,180	7.64%	166,984	8.85%	173,180	8.81%
Los Angeles	20,126	6.69%	19,157	7.28%	20,126	7.29%

Data Source: PBOCS DQC file and NPC keyed data file of the DQC Forms

*NPC source values due not to sum to National-level values reported in the report, since RCC code is not completed for all DQC forms.

Table L4: Recanvassed Workload by RCC

	PBOCS		Adjusted NPC		Combination	
RCC	**Count**	**Percent**	**Count**	**Percent**	**Count**	**Percent**
Puerto Rico	210,202	11.79%	210,571	12.39%	195,644	11.45%
Boston	68,497	7.70%	65,334	8.22%	61,699	7.50%
New York	449	8.55%	485	10.77%	434	8.65%
Philadelphia	29,102	6.28%	29,743	7.17%	27,403	6.27%
Detroit	65,005	6.50%	66,130	7.39%	60,313	6.42%
Chicago	23,950	5.64%	20,841	5.61%	22,241	5.52%
Kansas City	112,243	3.92%	111,320	4.45%	102,717	3.88%
Seattle	38,698	5.44%	36,224	6.28%	33,272	5.53%
Charlotte	16,028	7.09%	15,125	7.96%	14,821	7.07%
Atlanta	59,208	8.08%	48,720	8.18%	49,740	7.65%
Dallas	159,285	7.21%	147,936	8.00%	141,828	7.17%
Denver	123,604	5.45%	109,669	5.81%	105,099	5.35%
Los Angeles	23,942	7.96%	20,360	7.74%	21,138	7.78%

Data Source: PBOCS DQC file and NPC keyed data file of the DQC Forms

*NPC source values due not to sum to National-level values reported in the report, since RCC code is not completed for all DQC forms.

Table L5: Percentage of DQC Forms with the Correct Sample Size

RCC	Percentage
Puerto Rico	99.66
Boston	99.44
New York	100.00
Philadelphia	99.55
Detroit	99.52
Chicago	99.36
Kansas City	99.57
Seattle	99.32
Charlotte	99.52
Atlanta	99.55
Dallas	99.44
Denver	98.23
Los Angeles	98.72

Data Source: NPC keyed data file of the DQC Forms

Table L6: Average AA Size and Average DQC Size by RCC

RCC	Average AA Size	Average DQC Size
Puerto Rico	94	7
Boston	62	5
New York	72	6
Philadelphia	68	5
Detroit	70	5
Chicago	56	5
Kansas City	62	5
Seattle	65	5
Charlotte	61	5
Atlanta	66	5
Dallas	59	5
Denver	47	4
Los Angeles	87	6

Data Source: PBOCS DQC file

* All values were rounded up.

Table L7: Count and Percentage of AAs checked in DQC by RCC

RCC	AAs Checked	Total AAs Worked	Percentage
Puerto Rico	17,990	18,098	99.40%
Boston	13,285	13,381	99.28%
New York	69	70	98.57%
Philadelphia	6,325	6,414	98.61%
Detroit	13,347	13,473	99.06%
Chicago	7,026	7,153	98.22%
Kansas City	42,309	42,875	98.68%
Seattle	9,156	9,234	99.16%
Charlotte	3,410	3,441	99.10%
Atlanta	9,801	9,909	98.91%
Dallas	32,105	33,494	95.85%
Denver	41,793	42,175	99.09%
Los Angeles	3,121	3,173	98.36%

Data Source: NPC keyed data file of the DQC Forms

* NPC source values due not to sum to National-level values reported in the report, since RCC code is not completed for all DQC forms.

Table L8: Count and Percentage of AAs that failed DQC by RCC

	PBOCS		Adjusted NPC	
RCC	**Count**	**Percent**	**Count**	**Percent**
Puerto Rico	2,252	12.44	2,349	13.15
Boston	943	7.05	985	7.70
New York	7	10.00	8	14.04
Philadelphia	392	6.11	400	6.66
Detroit	841	6.24	903	7.11
Chicago	360	5.03	350	5.31
Kansas City	1,613	3.76	1,749	4.33
Seattle	473	5.12	502	5.76
Charlotte	243	7.06	237	7.67
Atlanta	753	7.60	736	8.11
Dallas	2,246	6.71	2,319	7.45
Denver	1,862	4.42	2,003	4.99
Los Angeles	256	8.07	246	8.22

Data Source: PBOCS DQC file and NPC keyed data file of the DQC Forms

Table L9: Number of AAs Production Enumerators Failed during DQC by RCC

Number of AAs Failed DQC	RCC												
	Boston	New York	Philadelphia	Detroit	Chicago	Kansas City	Seattle	Charlotte	Atlanta	Dallas	Denver	Los Angeles	Puerto Rico
1	625	5	284	535	241	1,115	315	170	497	1,157	1,155	156	1,322
2	112	1	42	115	27	178	66	25	90	298	244	38	289
3	20	0	8	16	6	37	6	4	20	73	36	5	89
4	5	0	0	7	5	4	2	0	4	28	17	1	12
5	1	0	0	0	0	3	0	1	0	12	6	1	5
6	0	0	0	0	0	0	0	1	0	9	1	0	2
7	0	0	0	0	0	0	0	0	0	3	1	0	0
8	0	0	0	0	0	0	0	0	0	1	0	0	0
9	1	0	0	0	3	0	0	0	0	1	0	0	0
10	0	0	0	0	0	0	0	0	0	1	0	0	0
All	**764**	**6**	**334**	**673**	**282**	**1,337**	**389**	**201**	**611**	**1,583**	**1,460**	**201**	**1,719**

Data Source: PBOCS DQC file

Table L10: Breakdown of Critical Errors by RCC

Tasks	RCC												
	Boston	**New York**	**Philadelphia**	**Detroit**	**Chicago**	**Kansas City**	**Seattle**	**Charlotte**	**Atlanta**	**Dallas**	**Denver**	**Los Angeles**	**Puerto Rico**
Production Enumerator did not add LQ to Add Page OR Production Enumerator added LQ in error	466	2	158	343	147	719	257	93	349	973	894	210	942
Production Enumerator verified or corrected address when the address should not have been included in the universe (delete, duplicate, uninhabitable, empty mobile home site, or nonresidential)	234	0	61	229	92	539	199	83	213	795	849	72	669
Production Enumerator removed the address from the universe (delete, duplicate, uninhabitable, empty mobile home site, or nonresidential) when it should have been verified or corrected	327	0	161	349	175	847	168	276	373	1,343	901	118	1,398
All Critical Errors	**1,027**	**2**	**380**	**921**	**414**	**2,105**	**624**	**452**	**935**	**3,111**	**2,644**	**400**	**3,009**

Data Source: NPC keyed data file of the DQC Forms

Table L11: Breakdown of Noncritical Errors by RCC

Tasks	RCC												
	Boston	New York	Philadelphia	Detroit	Chicago	Kansas City	Seattle	Charlotte	Atlanta	Dallas	Denver	Los Angeles	Puerto Rico
House Number Incorrect	473	1	363	558	245	1,021	217	224	561	1,102	1,024	107	1,529
Error in Street Name on Listing or Add Pages	385	11	209	690	334	1,173	259	184	289	933	1,051	158	1,368
Incorrect or Missing Unit Designation	307	3	110	166	131	378	144	76	113	340	411	90	788
Address incomplete	707	15	484	841	359	1,462	455	240	365	1,152	1,213	144	2,788
Map Spot Error	1,141	9	503	1,048	424	1,952	685	323	890	3,005	2,636	339	2,666
Street or Road Name not corrected on map	202	7	139	165	95	379	112	53	112	309	361	65	602
All Noncritical Errors	**3,215**	**46**	**1,808**	**3,468**	**1,588**	**6,365**	**1,872**	**1,100**	**2,330**	**6,841**	**6,696**	**903**	**9,741**

Data Source: NPC keyed data file of the DQC Forms

Table L12: Calculated AOQL for Critical and Noncritical Errors

RCC	AOQL Critical Error Percent	AOQL Noncritical Error Percent
Puerto Rico	7.17	19.12
Boston	7.62	22.24
New York	7.07	21.55
Philadelphia	7.62	19.49
Detroit	7.62	19.63
Chicago	7.99	22.94
Kansas City	7.78	20.49
Seattle	7.46	23.02
Charlotte	7.53	23.95
Atlanta	7.79	20.62
Dallas	7.97	22.74
Denver	7.31	31.86
Los Angeles	6.82	21.99

Data Source: Combination of PBOCS DQC file and NPC keyed data file of the DQC Forms

Table L13: Number of days between AA Binder Checked in from Production and Checked out for QC by RCC

RCC	Number	Mean	Stand Dev	Minimum	Maximum
Puerto Rico	18,098	1.21	1.75	0	24
Boston	13,381	0.68	1.52	0	26
New York	70	0.97	1.10	0	4
Philadelphia	6,414	0.95	1.31	0	13
Detroit	13,473	1.39	1.88	0	29
Chicago	7,153	1.70	1.78	0	19
Kansas City	42,875	0.89	1.30	0	20
Seattle	9,234	0.99	1.80	0	20
Charlotte	3,441	1.20	1.57	0	20
Atlanta	9,909	1.29	1.57	-1	14
Dallas	33,494	1.48	2.46	-9	25
Denver	42,175	0.61	1.35	-2	22
Los Angeles	3,173	1.33	2.11	0	28

Data Source: PBOCS DQC file

Table L14: Number of days between AA Binder Checked in from Production and Checked in for QC by RCC

RCC	Number	Mean	Stand Dev	Minimum	Maximum
Puerto Rico	18,098	7.25	4.30	0	30
Boston	13,381	7.62	3.73	0	29
New York	70	3.77	2.30	1	8
Philadelphia	6,414	7.06	3.53	0	26
Detroit	13,473	8.21	4.02	0	37
Chicago	7,153	8.29	3.57	1	27
Kansas City	42,875	7.40	3.40	0	30
Seattle	9,234	8.66	4.52	0	29
Charlotte	3,441	6.23	3.09	0	27
Atlanta	9,909	7.05	3.51	1	32
Dallas	33,494	7.77	4.22	-2	31
Denver	42,175	8.79	4.21	0	31
Los Angeles	3,173	7.87	4.08	1	29

Data Source: PBOCS DQC file

Table L15: Length of the Production Field Work in Days by RCC

RCC	Number	Mean	Stand Dev	Minimum	Maximum
Puerto Rico	18,098	10.47	4.99	0	28
Boston	13,381	22.36	9.2	0	55
New York	70	19.30	6.97	4	27
Philadelphia	6,414	17.14	6.57	0	32
Detroit	13,473	17.76	8.00	0	42
Chicago	7,153	9.33	6.40	0	35
Kansas City	42,875	19.26	7.39	0	41
Seattle	9,234	23.68	9.46	0	51
Charlotte	3,441	15.39	8.61	0	42
Atlanta	9,909	12.55	6.56	0	36
Dallas	33,494	13.91	8.89	0	42
Denver	42,175	21.81	8.80	0	52
Los Angeles	3,173	18.67	7.16	1	40

Data Source: PBOCS DQC file

Table L16: Length of the QC Field Work in Days by RCC

RCC	Number	Mean	Stand Dev	Minimum	Maximum
Puerto Rico	18,098	6.03	4.09	0	26
Boston	13,381	6.94	3.77	0	29
New York	70	2.80	1.64	1	7
Philadelphia	6,414	6.12	3.47	0	25
Detroit	13,473	6.83	3.73	0	27
Chicago	7,153	6.59	3.45	0	26
Kansas City	42,875	6.52	3.29	0	29
Seattle	9,234	7.67	4.46	0	28
Charlotte	3,441	5.03	2.93	0	26
Atlanta	9,909	5.77	3.34	0	28
Dallas	33,494	6.29	3.79	0	29
Denver	42,175	8.18	4.25	0	29
Los Angeles	3,173	6.54	4.13	0	25

Data Source: PBOCS DQC file

Table: Comparing Common Variables in the PBOCS DQC File and the NPC DQC File

	Count of AAs with Different Results	Eligible AAs*	Percent
Pre-printed Variables			
LCO Code and AA number	755	199,226	0.38
RCC Code	320	199,218	0.16
State Code	492	191,780	0.26
Production Enumerator Applicant ID	1,845	199,207	0.93
Sample Size	12,509	193,415	6.47
AA Size	151,221	191,977	78.77
Other Variables in Common			
DQC Results	2,758	191,366	1.44
QC Enumerator Applicant ID	42,605	191,023	22.30

Data Source: Combination of PBOCS DQC file and NPC keyed data file of the DQC Forms

*AAs are excluded from various variable categories due to missing results in the NPC DQC file, and so the percentages are calculated based on the forms that contain data.

Regional Census Center (RCC)-Level Office Review Form Tables

Table: Count and Percentage of AAs that Failed Office Review by RCC

	PBOCS		NPC	
RCC	**Count**	**Percent**	**Count**	**Percent**
Puerto Rico	1,972	10.90	2,085	13.72
Boston	488	3.65	452	3.63
New York	2	2.86	0	0.00
Philadelphia	511	7.97	493	8.49
Detroit	586	4.35	481	4.63
Chicago	432	6.04	336	6.74
Kansas City	2,052	4.79	1,656	7.30
Seattle	293	3.17	200	3.26
Charlotte	144	4.18	76	3.57
Atlanta	702	7.08	626	7.51
Dallas	1,166	3.48	880	3.64
Denver	1,457	3.45	1,146	3.75
Los Angeles	163	5.14	83	5.30

Data Source: PBOCS DQC file and NPC keyed data file of the Office Review Forms

*NPC source values due not to sum to National-level values reported in the report, since RCC code is not completed for all Office Review forms.