

Evaluation of the Local Update of Census Addresses 99 (LUCA 99)

FINAL REPORT

This evaluation study reports the results of research and analysis undertaken by the U.S. Census Bureau. It is part of a broad program, the Census 2000 Testing, Experimentation, and Evaluation (TXE) Program, designed to assess Census 2000 and to inform 2010 Census planning. Findings from the Census 2000 TXE Program reports are integrated into topic reports that provide context and background for broader interpretation of results.

Karen L. Owens

Planning, Research,
and Evaluation Division

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EXECUTIVE SUMMARY

The U.S. Census Bureau conducted the Census 2000 Local Update of Census Addresses 99 program in update/leave and update/enumerate areas of the country from January of 1999 to June of 2000. We invited local and tribal governments to participate and those who participated were sent counts of housing units in blocks and lists of addresses in their area. Governments identified any block counts they deemed inaccurate and the Census Bureau recanvassed those blocks. This report documents the results of the Local Update of Census Addresses 99 operations. A summary of those results follows.

How many governmental units participated in Local Update of Census Addresses 99 and what are their characteristics?

There were 30,375 functioning governmental units eligible to participate in the Local Update of Census Addresses 99 program. A total of 10,925 governments participated and they covered approximately 67.9 percent of the housing units in eligible areas. About 36 percent of eligible governments participated; 17 percent of eligible governments challenged any blocks. They challenged a total of 117,073 blocks out of 3.5 million blocks in areas eligible for Local Update of Census Addresses 99.

The majority of eligible entities were in the Midwest, however that region had the lowest participation rate. Larger governments (as determined by the number of housing units in the government's jurisdiction in 1990) participated at higher rates.

How many addresses were on the address list before Local Update of Census Addresses 99 Recanvass and what updates did field representatives make to them in the field?

We sent 2,186,765 addresses out for review in the Local Update of Census Addresses 99 Recanvass operation in the U.S. Field representatives verified that about 76 percent of them existed as residential units. They deleted approximately 6 percent of the addresses and determined that less than two tenths of a percent were nonresidential. They made corrections to the remaining 18 percent of addresses on their lists.

We sent a total of 35,563 addresses out for review in Puerto Rico. Field representatives verified that about 93 percent of them existed as residential units. They deleted approximately 7 percent and determined that less than one tenth of a percent were nonresidential. There were no corrected addresses in Puerto Rico.

How many addresses did field representatives add in Local Update of Census Addresses 99 Recanvass and what are their characteristics?

Field representatives for the Local Update of Census Addresses 99 Recanvass operation updated the address list and added any units that existed as a residential unit in the block that were not already on the list. They added a total of 328,174 addresses, which represents a 15 percent

increase in housing units in Update/Leave enumeration areas in the U.S. (excluding Puerto Rico) that were recanvassed. Field representatives added a total of 9,874 addresses in Puerto Rico, which represents an approximate 28 percent increase in housing units in areas that were recanvassed.

There were about 3.5 million blocks in areas where we conducted Local Update of Census Addresses 99 and approximately 110,728 of those blocks were included in the Local Update of Census Addresses 99 Recanvass operation and had at least one address update (verified, deleted, declared nonresidential, corrected, or added). About 53 percent of blocks in the Recanvass had at least one address added.

Approximately 99.5 percent of Local Update of Census Addresses 99 Recanvass adds in the U.S. and Puerto Rico were included on the initial census address list. About 85.2 percent of those adds were in the final census housing unit inventory. The majority (80.1 percent) of adds in the U.S. (excluding Puerto Rico) were single unit structures. About 79.4 percent of adds have complete city-style address information, making them easier to locate in census field operations. Due to a processing error, all of the adds in Puerto Rico do not have city-style address information reflected on the Master Address File, and hence all appear to be single unit structures.

What are the characteristics of Local Update of Census Addresses 99 Recanvass deletes?

Local Update of Census Addresses 99 Recanvass field representatives deleted (or declared nonresidential) a total of 145,378 addresses from their listing pages in the U.S. and 2,543 addresses in Puerto Rico. Of the 110,728 blocks that had at least one address update in Local Update of Census Addresses 99 Recanvass, about 36 percent of the blocks had at least one address deleted. The deletes represent 6.7 percent and 7.1 percent of the addresses on the list before the Recanvass in the U.S. and Puerto Rico, respectively.

Like the adds, the majority of deletes (85.7 percent) in the U.S. were single unit structures. Also, about 74.3 percent had complete city-style address information. Due to a processing error, all the deletes in Puerto Rico do not have city-style address information and appear on the Master Address File as single unit structures.

What are the characteristics of Local Update of Census Addresses 99 Recanvass corrections?

LUCA Recanvass field representatives corrected a total of 388,838 addresses in the U.S. and Puerto Rico. Of the 110,728 blocks that had at least one address update in Local Update of Census Addresses 99 Recanvass, about 55 percent of the blocks had at least one address corrected. About 85.5 percent of corrections were made to single unit structures and about 81.1 percent of corrected units have complete city-style address information on the Master Address File.

How many addresses did participants appeal and what was the result of the appeals process?

After participating local governments received feedback from the Census Bureau they could appeal specific addresses. Participants appealed a total of 18,442 addresses. Appealed addresses that the Census Address List Appeals Office (in the Office of Management and Budget) approved were added to the Master Address File . Approximately 54 percent (10,053) of the addresses appealed by local governments were included on the final census address list.

What is the overall assessment of the Local Update of Census Addresses 99 operations?

The address list for Local Update of Census Addresses 99 areas was created by the Census 2000 Address Listing operation. There were approximately 23,227,788 addresses from Address Listing (in the U.S. and Puerto Rico) that were geocoded with a mapspot and eligible for review in the Local Update of Census Addresses 99 program.

About 36 percent of the 30,375 eligible local and tribal governments participated in the Local Update of Census Addresses 99 program. The total number of addresses that were to be reviewed by participants represented about 68 percent of the housing units in eligible areas.

There were approximately 3.5 million blocks in Local Update of Census Addresses 99 areas and only a portion of those blocks were reviewed by participating governments. About 17 percent of participating governments challenged blocks. They challenged a total of 110,728 blocks and the Census Bureau sent those blocks to Recanvass. Of the small number of challenged blocks, about 79 percent had addresses that were either added, deleted, or corrected by field representatives. About 53 percent of the challenged blocks yielded any adds, 36 percent yielded deletes, and 55 percent yielded corrections.

The Local Update of Census Addresses 99 program aided in updating the address list in some areas. Given these results, it seems plausible that additional local and tribal governments would have benefitted from participating in the Local Update of Census Addresses 99 program. **We recommend that the Census Bureau continue to pursue Local Update of Census Addresses type programs in non-city-style address areas for future censuses and tests. Also, the Census Bureau should investigate ways to increase government participation in Local Update of Census Addresses programs.**

1. BACKGROUND

The U.S. Census Bureau established a program to work with local and tribal governments to update the address list for Census 2000. This program is referred to as the Local Update of Census Addresses (LUCA) or Address List Review. The LUCA program is required by the Census Address List Improvement Act of 1994 [Public Law 103-430].

This evaluation documents the results of the LUCA operation conducted in enumeration areas where the Census Bureau chose to update the existing address list while either enumerating the household or leaving a questionnaire to be mailed back. In these areas, for Census 2000, we refer to the LUCA program as "LUCA 99".

1.1 Precensus and Postcensus Local Review for the 1990 Census

The Census Bureau conducted two operations to improve housing unit coverage for the 1990 Census that involved the assistance of local governmental units. In both operations, governmental units had the opportunity to review census housing unit counts in their jurisdiction. The Precensus Local Review was conducted prior to Census Day, and the Postcensus Local Review was conducted after Census Day.

1.1.1 Precensus Local Review

The Census Bureau conducted a Precensus Local Review during the 1990 Census in all mailout/mailback enumeration areas.¹ The objective was to provide local officials of functioning governments the opportunity to review preliminary housing unit and special place counts for areas in their jurisdiction. The Census Bureau delivered counts of housing units to local officials to review, and to identify and document discrepancies. Census Bureau staff resolved some discrepancies in the office. If they could not resolve discrepancies in the office, then additional field review occurred. For some discrepancies, they selected blocks to be recanvassed based on specific criteria.

A total of 21,048 governmental units were eligible to participate in the 1990 Precensus Local Review, and 16.3 percent of those governments participated. Of the 3,440 governmental units that participated, 2,883 of them challenged housing unit counts. The remaining 557 participants either agreed with the counts or they disagreed but they did not provide proper documentation to identify discrepancies. Approximately 121,000 blocks were challenged and Census Bureau field representatives recanvassed 52 percent of those blocks. The 1990 Precensus Local Review added 367,313 housing units to the national housing inventory (Commerce, 1993).

¹ Update/Leave and Update/Enumerate areas that were the focus of the LUCA 99 program for Census 2000 were not part of the 1990 Precensus Local Review. This section is provided for information about LUCA-type programs conducted in 1990 Census, not for comparison.

1.1.2 Postcensus Local Review

The Census Bureau conducted the Postcensus Local Review operation after the census to help improve housing unit coverage after Census Day. Local government officials had the opportunity to review post-census housing unit counts and group quarters population counts, as well as boundary maps to identify any major discrepancies. Unlike the Precensus Local Review, governmental units in all enumeration areas were eligible to participate in the Postcensus operation.

A total of 9,847 governmental units out of the 39,198 eligible governmental units participated in the Postcensus Local Review. About 67 percent of participants (6,602 governmental units) challenged the Census Bureau's housing unit counts with the proper documentation. They challenged a total of 270,650 blocks and Census Bureau enumerators recanvassed 62 percent of the blocks. The Postcensus Local Review operation added 80,929 housing units to the national housing inventory in 1990, which translated to an add rate of 0.08 percent.

1.2 LUCA for the Census 2000 Dress Rehearsal

The Census Bureau conducted the LUCA operation in all three sites for the Census 2000 Dress Rehearsal. Local and tribal governments could review and improve a list of housing units in mailout/mailback and update/leave enumeration areas. The City of Sacramento and the Menominee Tribal governments participated, and 51.6 percent of the 60 eligible governments in the South Carolina site participated. These governments accounted for 98 percent of the 1990 Census housing units in the South Carolina site.

Participating governments provided feedback in the form of recommended adds, deletes, or corrections of addresses to the Master Address File (MAF). Participants added a total of 988 addresses to the MAF in Sacramento, 11,621 addresses in South Carolina, and 25 addresses in Menominee (Howard, 1999).

1.3 LUCA operations for Census 2000

The Census Bureau invited all eligible functioning and tribal governments to participate in the Census 2000 LUCA operations. Governmental units were eligible for one or both of the operations depending on the type of enumeration areas contained in their jurisdiction. The two operations were:

1. LUCA 98: Operation for any functioning government that had any addresses in areas where the Census Bureau planned to use a mailout/mailback enumeration method. These areas generally had city-style addresses, that is, addresses with a house number and street name ("123 Main Street", for example). For these areas, participating governments reviewed the address list for their jurisdiction and added, corrected, deleted or identified addresses on the list as nonresidential. The Census Bureau verified

virtually all of these updates in the field through the Block Canvassing operation or a special LUCA 98 Field Verification operation.

1. LUCA 99: Operation for any functioning government that had any addresses in areas where the Census Bureau did not plan to use a mailout/mailback enumeration method, but rather an update/leave or update/enumerate enumeration method.² These areas included Puerto Rico and any areas that generally have non-city-style addresses, that is, addresses that did not have a house number and street name for mail delivery but had location descriptions and map spots on the census address list. For these areas, participating governments reviewed counts of housing units in blocks in their jurisdiction. The Census Bureau recanvassed blocks that the governments identified as having incorrect housing unit counts.

This report provides the results of the Census 2000 LUCA 99 operation. Please see the forthcoming Census 2000 evaluation report titled “Evaluation of the Local Update of Census Addresses 1998 (LUCA 98)” for results of the LUCA 98 operation.

1.4 Overview of the LUCA 99 Operation

The Census Bureau conducted the Census 2000 LUCA 99 operation between January 1999 and June 2000. Because the Address Listing operation, which was the source for the addresses and housing unit counts to be reviewed, took place in “waves” at different times, the Census Bureau could not provide all governmental units with address review materials at the same time. The timing of the specific steps of the operation was different across governmental units. The following steps define the operation:

1. We invited all functioning local and tribal governments with update/leave or update/enumerate areas in their jurisdiction to participate in the LUCA 99 program for Census 2000. Governments that wished to participate had to identify a liaison and sign a confidentiality agreement with the Census Bureau.
2. We provided participating governmental units with a tally of housing unit counts for each Census 2000 collection block in their jurisdiction, the related maps showing map spots (housing unit locations), and a paper or computer readable file of their portion of the Census 2000 address list.

²In these areas, the initial census address list was created by the Census 2000 Address Listing operation. At census time, enumerators updated the existing address list in these areas and enumerated the household (Update/Enumerate) or left a questionnaire to be returned by the respondent (Update/Leave). Areas where the Census Bureau listed housing units and enumerated people at the same time, referred to as List/Enumerate, were not included in the LUCA 99 operation because no address list existed for these areas in advance of Census 2000.

3. We instructed participating governments to review the counts and identify discrepant block counts; that is, blocks for which their information shows a higher or lower number of housing units. Governments could review block counts, but could not provide specific housing unit adds, deletions, or corrections. The review period was generally six weeks. We refer to the identification of discrepant blocks as the local government “challenging” a block in this report.
4. We recanvassed all blocks that participating governments identified as discrepant and updated the address lists in those blocks. The recanvass took place from August through December 1999, and we refer to it in this report as “LUCA 99 Recanvass.” See section 1.4.3 of this report for more details on the recanvass operation.
5. We provided participating local governments with detailed feedback/final determination materials from LUCA 99 Recanvass.
6. We gave local governments the opportunity to appeal final Census Bureau decisions to a Census Address List Appeals Office established by the Office of Management and Budget. See section 1.4.4 of this report for more details.

1.4.1 Geography for LUCA 99

As previously mentioned, the Census Bureau conducted the LUCA 99 operation in areas where we planned to update the existing address list and enumerate households (or hand-deliver census questionnaires to be returned by the respondent) at the same time. We used these enumeration/delivery methods in these areas because Census Bureau staff decided that developing an accurate mailing list would be problematic since the addresses usually did not have a house number and street name for mail delivery, but instead had rural route descriptions and post office boxes. The census address list was initially created by the Address Listing operation in these areas. LUCA 99 was the next opportunity for updating the list before enumeration. Specifically, the LUCA 99 operation included the following types of enumeration areas (TEA):

- ! Update/Leave (TEA 2): Enumerators delivered questionnaires to all housing units compiled during Address Listing. While delivering the questionnaires, they also updated the address list and map spots to reflect housing units that were not listed previously, eliminated residences that they could not locate, and made corrections to addresses.
- ! Rural Update/Enumerate (TEA 5): Enumerators visited all residences on the address list and completed the enumeration on-site. They also updated the address list and map spots.
- ! Update/Leave from Mailout/Mailback (TEA 9): These areas were initially mailout/mailback, but the Census Bureau determined that there were large numbers of non-city-style addresses in these areas and decided to use an update/leave enumeration

strategy. The address list was compiled during the Address Listing operation and reviewed in Supplemental LUCA 99. See section 1.4.2 for more details on Supplemental LUCA.

The Census Bureau did not include List/Enumerate areas (TEA 3) in the LUCA 99 operation since there was no address list for these areas in advance of Census 2000 data collection operations.

1.4.2 Supplemental LUCA 98

The Supplemental LUCA 98 universe consists of governmental units that were originally in the LUCA 98 program. Due to one of the following reasons the Geography Division of the Census Bureau (GEO) produced their review materials later than planned:

- ! The government had an address list that contained insufficient housing units at the time of LUCA 98 production and a decision was made to not provide the review materials until after the Block Canvassing operation made the list appear “reviewable.”
- ! The government was in the Census 2000 Dress Rehearsal
- ! The government expressed disappointment with the initial address list they received in LUCA 98

Geography Division decided that they would wait to produce LUCA products for these governments until they updated the address list with the results of the Block Canvassing operation. Subsequently, we reclassified some or all of the blocks in these areas from a mailout/mailback enumeration area to an update/leave enumeration area (TEA 9). Therefore, GEO also had to wait for the address list to be updated with the results of the Address Listing operation before they produced review materials for some of these governments.

Geography Division used the LUCA 98 system to produce Supplemental LUCA materials for blocks that remained in mailout/mailback areas, but they used the LUCA 99 system to produce materials for blocks in TEA 9. This report includes the results of government participation and the field recanvass for the Supplemental LUCA program blocks that were in TEA 9 and processed in the LUCA 99 system.

1.4.3 LUCA 99 Recanvass

Once participating governments “challenged”³ blocks, we sent those blocks to the LUCA 99 Recanvass operation. Field representatives compared what was on the ground to what was on the listing page and:

³The local and tribal government identified blocks for which their housing unit counts were higher or lower than those the Census Bureau provided.

- Verified addresses and address information at every housing unit
- Corrected address information
- Deleted addresses that did not exist, were a duplicate of another address existing in the block, or were uninhabitable.
- Identified commercial addresses as nonresidential.
- Added any addresses found that were not listed on the listing page by entering the block number, map spot number, physical location address, mailing address and E-911 address. The lister also spotted the location of the housing unit on the map and assigned a map spot number.
- Updated maps by adding new streets; deleting streets or features that are on the map but not on the ground; and adding or correcting feature names.

Geography Division updated the address list, or the Master Address File (MAF), with the LUCA 99 Recanvass results and provided them to all eligible participating governments in Detailed Feedback/Final Determination materials.

1.4.4 LUCA 99 Appeals

A local or tribal government that was not satisfied with the results of their detailed feedback from the recanvass could formally appeal the Census Bureau's action. The participant could only appeal addresses in blocks they had previously challenged. The Appeal process consisted of the following:

1. The local or tribal government had 30 days to file an appeal after they received the results of the recanvass. The local or tribal government submitted documentary evidence, including a map spot on a map and a descriptive address to the Census Address List Appeals Office.⁴
2. Once the eligible local or tribal government filed an appeal, the Census Bureau had 15 days to provide a standard or customized appeal response with any supporting documentation to the Appeal Official.
3. The Appeal Official made the final decision (and provided written documentation of the

⁴The Census Address List Appeals Office was a temporary Federal office, established separate from and independent of the Department of Commerce by the Office of Management and Budget (in accordance with the provisions of Public Law 103-430), to administer the appeals process for the LUCA programs.

findings) on whether to add the address to the MAF and the Census 2000 enumeration process.

1.5 Updating the DMAF with LUCA 99 results

The Decennial Master Address File (DMAF) is a subset of the MAF that is the address list for Census 2000. All LUCA 99 Recanvass adds were added to the MAF, however, they were delivered to the DMAF only if sufficient address information was present. Addresses on the DMAF were eligible for inclusion in the final census, however, updates from subsequent operations may have deemed the address ineligible for inclusion in the final census. DMAF deliverability and the final census status of LUCA 99 Recanvass adds will be presented in this report.

2. METHODS

2.1 Census files used in this evaluation

Geography Division created the files we used for the LUCA 99 participation analysis in section 4.1 of this report. There were two governmental unit level files, one for LUCA 99 and one for Supplemental LUCA. The files included variables related to participation that GEO obtained from different production files.

We used the March 2001 MAF extracts to produce the majority of the housing unit level numbers for this evaluation. These extracts contain housing units, group quarters, and special place addresses provided by every MAF building operation that happened before and during Census 2000. The extracts also contain information about actions taken on the addresses by the different operations. We limited this evaluation to housing unit addresses, and therefore removed group quarters and special place addresses from our analyses.

We used the November 2000 extracts to produce one statistic of interest in this report. We characterize LUCA 99 Recanvass adds by whether the block provided by the operation agrees with the current official block (see Results section 4.3.5). The block flag variable we used for this analysis was not correct on the March 2001 extracts due to a software processing error, therefore we reverted to using the November 2000 extract for this statistic.

2.2 Definition of a LUCA 99 participant

There were multiple steps involved in taking part in the LUCA 99 operation for Census 2000. Geography Division sent functioning governmental units invitation letters, governments interested in participating were to indicate so, provide GEO with the name of a liaison, and sign a confidentiality agreement. For this report, we used the following criteria to define a governmental unit as a participant in the program. They:

- ! Agreed to participate
- ! Signed a confidentiality agreement
- ! Did not drop out or become a disincorporated government at any time during the LUCA process

2.3 Levels of geography used for analysis

During field operations, collection geography, based on physical boundaries, was used to help listers find units in the field. For evaluation purposes, we characterize the adds by where the housing units actually are for tabulation purposes. Therefore, in this evaluation we analyze data using tabulation geography, with one type of statistic being an exception (See results sections 4.3.1, 4.4.1 and 4.5.1). In general, collection state and county would not be different from tabulation state and county but they could be different on occasion because of keying or other errors.

2.4 Separate analysis for some geography

We provide characteristics of LUCA 99 participants in this report. In some cases, results for American Indian and Alaska Native governmental units are presented in separate tables or in the text after we present information for other governments.

In this report we present results for both the U.S. and Puerto Rico. In some cases, results for Puerto Rico can be found in a table or text following the results for the U.S.

2.5 Original source of an address

Evaluations of the MAF-building operations required identification of the source of every address on the MAF. An Original Source variable, which did not exist on the MAF, was defined and created by the Planning, Research and Evaluation Division (PRED) and the Decennial Statistical Studies Division (DSSD). This variable identifies the first operation or file to add the address to the MAF, with the following three qualifications.

- If one operation added an address, but a later operation also identified the address in a different TEA, the first operation does not receive credit for adding this address.
- An address may not have sufficient operational information to indicate how the address was added to the MAF.
- In cases where on MAF-building operation overlapped with at least one other MAF building operation and the address was added independently in each operation, we give credit to each operation. An example of this is the Original Source category “LUCA 1998 and Block Canvassing.”

Therefore, the Original Source variable identifies the first operation or operations to add the

address to the TEA in which it exists for the Census, provided there is sufficient information to identify a TEA and an operation. For additional information on how this variable was defined, see the PRED TXE/2010 Memorandum Series: MAF-EXT-S-01, “Determining Original Source for the November 2000 Master Address File for Evaluation Purposes.”

When computing statistics of interest for this report, it was necessary to collapse the different values of original source into three categories, defined by their relationship to LUCA 99:

- Pre-LUCA 99: The source for the address was an operation valid in TEAs 2, 5 and 9 and was conducted before the LUCA 99 operation. These operations include Address Listing and the Census 2000 Dress Rehearsal.
- LUCA 99 Recanvass: The source for the address was the LUCA 99 Recanvass operation.
- Some Other Source: The address is not currently located in TEAs 2,5, or 9 and an operation appropriate for the TEA where the address is located is the original source for the address.

2.6 Type of Enumeration Area

For the majority of statistics in this report we did not limit the analysis to the TEAs appropriate for LUCA 99. That is, TEAs 2, 5 and 9 as described in the Background section 1.4.1. We do present some statistics by TEA. In those instances, the six TEAs that were not eligible for the LUCA 99 operation are collapsed in an “inappropriate for the operation” category.

One statistic in this evaluation is limited to the TEAs appropriate for LUCA 99. That is the geographic clustering of adds, deletes and corrections. Refer to sections 4.3.1, 4.4.1 and 4.5.1 for that data.

2.7 Type of address

This evaluation looks at addresses by type of address information. We classify addresses into five categories based on the highest criteria met. The categories are: complete city-style, complete rural route, complete P.O. Box, incomplete address and no address information.

- ▶ The city-style category includes all units that had a complete city-style address, which consists of a house number and street name.
- ▶ The Rural Route category includes units that did not have a complete city-style address but did have a complete rural route address, such as Rural Route 2, Box 3.
- ▶ The P.O. Box category includes units that did not have a complete city-style or rural route address but did have a complete P.O. Box address, such as P.O. Box 5.

- ▶ The incomplete category includes units that had some address information but did not have a complete address of any type.
- ▶ The no address information category includes units that are missing house number, street name, Rural Route, and P.O. Box information.

Addresses are further delineated by whether or not the address had a physical/location description provided during a Census 2000 field operation. For additional information on how this variable was defined, see PRED/TXE/2010 Memorandum Series: MAF-EXT-D-01, “Determining Address Classification for Master Address File (MAF) Evaluation Purposes.”

2.8 Addresses sent to LUCA 99 Recanvass that came back as “added”

Some addresses on the MAF extract used for analysis have an action code of “add” from LUCA 99 Recanvass even though we sent them out on the address list for field representatives to update. Field representatives may have missed the address on their list and added it to the list again. We classify the 662 addresses that were added again (6 in Puerto Rico and 656 in the U.S.) as “verified” housing units in this report rather than “added” housing units.

2.9 Applying quality assurance procedures

We applied quality assurance procedures throughout the creation of this report. They encompassed how we determined evaluation methods, created specifications for project procedures and software, designed and reviewed computer systems, developed clerical and computer procedures, analyzed data, and prepared this report. For a description of these procedures, reference “Census 2000 Evaluation Program Quality Assurance Process.”

3. LIMITS

3.1 Using 1990 housing unit counts

In order to assess the impact of individual government participation, we present government participation in LUCA 99 by their 1990 housing unit size. Some governments did not exist in 1990, therefore they did not have any housing units in 1990 and are not included in that analysis. Although the 1990 housing unit sizes are likely an underestimate or overestimate of the true current housing unit size, it was our best measure of pre-Census 2000 housing unit sizes.

3.2 Data for Rhode Island and D.C.

The District of Columbia did not have any addresses in areas appropriate for LUCA 99, so it was not eligible to participate in the LUCA 99 operation, and will have no data presented in this report.

The state of Rhode Island had one participating government, however this government did not challenge any blocks. Therefore, there are no LUCA 99 Recanvass results to present for this state.

3.3 The basic street address size variable was overstated

The variable showing the number of housing units at a basic street address (BSA) on the MAF included all addresses indicated as DMAF deliverable during the census process. Only a subset of these addresses remained in the census. Therefore, the size of BSA variable on the MAF is overstated relative to the size of BSA as of the end of the census.

Additionally, the size of BSA variable was determined only for units with city-style address information. Units with non-city-style addresses are considered single units. Due to the processing error explained in section 3.4, all units in Puerto Rico have non-city-style address information for them on the MAF and are therefore recorded as single units regardless of their actual BSA size.

3.4 Processing of address information for Puerto Rico

The Decennial Systems and Contracts Management Office (DSCMO) had problems processing the keyed listing pages from the Address Listing operation in Puerto Rico. The keyed files had a 60 character address field that could contain a city-style address or a location description. The stateside files also had a flag, "A/D", set by the lister that indicated which it was. In the U.S., field representatives set the flag to "A" for a city-style address or "D" for a location description. In Puerto Rico, the flag was "D/L", and field representatives set the flag to "D" for a city-style address and "L" for a location description. When the DSCMO processed the files for Puerto Rico, they initially assumed that the "D" in the flag identified a "location description", as it did in the U.S., but the "D" actually stood for address (the word for address in Spanish starts with a "D"). The DSCMO attempted to fix this by reprocessing the files.

There were still major processing problems since listers could have set the flag incorrectly and there were unexpected address configurations such as urbanization⁵ appearing in the address field. As a result, the DSCMO and the GEO could not use the stateside standardizer on the address information to get correct information in the appropriate city-style address and location description fields on the MAF.

The GEO and the DSCMO decided to load the entire address field (city-style and location description information) in the location description field on the MAF. This processing decision continued for all address updating operations that the Census Bureau conducted in Puerto Rico after Address Listing. Due to this problem, there are no address records for Puerto Rico with city-style address information in the appropriate city-style address fields on the MAF extracts used for this evaluation.

3.5 Comparing results to previous censuses

The type of enumeration areas, enumeration methodologies, and analysis variables for Census 2000 may differ from previous censuses. Caution should be taken when comparing results across censuses. An example of an analysis variable that has changed from 1990 is size of structure--the closest approximation being size of basic street address in Census 2000. The 1990 census questionnaire included a question asking the respondent the number of units in the structure. In Census 2000, we defined the number of units at a basic street address on an address-level algorithm.

3.6 Special place and group quarters addresses may have been miscoded as housing units

LUCA 99 Recanvass may have incorrectly added or verified MAF records as housing units when the records actually referred to special places or group quarters. The LUCA 99 operation did not consist of a verification of this miscoding, and we do not know how often it occurred. This miscoding would generate an overstated count of housing units in the results.

⁵ Urbanization denotes an area, sector, or development within a geographic area. In addition to being a descriptive word, it precedes the name of the area. This descriptor, commonly used in Puerto Rican urban areas, is an important part of the addressing format of Puerto Rico, as it describes the location of a given street.

4. RESULTS

The following questions repeat the ones in the executive summary and provide expanded answers.

4.1 How many governmental units participated in LUCA 99 and what are their characteristics?

A total of 10,925 of the 30,375 eligible governmental units participated in the LUCA 99 program. The housing units in these participants' jurisdictions geographically covered approximately 67.9 percent of the housing units in areas eligible for LUCA 99. About 48 percent of participating governments challenged block counts. They challenged a total of 117,073 blocks.⁶

Table 1. LUCA 99 participants by type of governmental unit

Type of Governmental Unit	Number of Eligible Governmental Units	Participants*	
		Number	% of eligible
Alaska Native	12	0	0.00
American Indian	275	147	53.45
County	3,016	1,422	47.15
Incorporated Place	14,103	6,514	46.19
Minor Civil Division	12,969	2,842	21.91
Total eligible governmental units	30,375	10,925	35.97

*A government is a participant if they agreed to participate, signed a confidentiality agreement with the Census Bureau, and did not disincorporate or drop out of the program at any time.

Table 1 shows that a total of 30,375 governmental units had areas where the Census Bureau planned to use update/leave or update/enumerate enumeration methods and were eligible to participate in the LUCA 99 program. Approximately 36 percent of eligible governments participated in the program.

The majority of eligible governments were classified as incorporated places or minor civil divisions. Alaska Native governments and minor civil divisions had the lowest rates of participation in the program. All other types of governments had rates that were close to 50 percent.

⁶ Since some governmental units have overlapping boundaries, the number of challenged blocks may include the same block more than once if two overlapping governments participated and challenged the same block.

Table 2. LUCA 99 governmental units that challenged blocks by type of government

Type of Governmental Unit	Governmental units that challenged blocks		
	Number	% of eligible	% of participants
Alaska Native	0	0.00	0.00
American Indian	71	25.82	48.30
County	603	19.99	42.41
Incorporated Place	3,431	24.33	52.67
Minor Civil Division	1,170	9.02	41.17
Total governmental units that challenged blocks	5,275	17.37	48.28

Although 10,925 governments agreed to participate in the program, fewer challenged any block counts. A total of 5,275 governments challenged block counts. This represents 17.37 percent of all eligible governments and 48.28 percent of participating governments. Governments that did not challenge any blocks may have agreed with all census block counts or may have decided not to pursue the task of comparing counts.

Also, there were other duties in the program the government may have pursued. Approximately 11.4 percent of participating governmental units made boundary corrections to maps. Approximately 32.9 percent of participating governmental units made feature updates to maps.

Some governments that declined to participate gave reasons for doing so. Some of the reasons that were recorded include:

- ▶ The Census Bureau list is fine
- ▶ The operation was too expensive for them to conduct
- ▶ They had no time
- ▶ They had no source to produce counts of their addresses
- ▶ They had a bad previous experience with the Census Bureau
- ▶ They had previously returned other map updates

Table 3a shows the participation and percent of eligible entities that challenged blocks by region

of the United States and Puerto Rico.

Table 3a. LUCA 99 participants by region of the United States & Puerto Rico

Region	Eligible Governmental Units	Participants (% of eligible)	Block Challengers (% of eligible)
West	2,039	53.16	29.28
Midwest	17,521	28.43	15.20
Northeast	3,908	41.25	15.12
South	6,542	46.64	20.44
Puerto Rico	78	64.10	20.51
Total*	30,088	35.82	17.30

* Does not include American Indian and Alaska Native governmental units.

The West and South regions of the U.S. had the highest participation in LUCA 99. The Midwest had the largest number of entities and the lowest participation rate. This region has the largest number of governments, however many of them are small and may have declined to participate because they knew a larger government was looking at housing counts for their area. More than 64 percent of the 78 governments in Puerto Rico participated.

Although participation for most regions of the U.S. was above 40 percent, governments that challenged blocks in those areas represent a much lower percentage of eligible governments. Governments may have believed housing unit counts were accurate, or they chose not to pursue the task of comparing counts.

Participation by region for the American Indian and Alaska Native governments is different from the rest of the nation, as can be seen in Table 3b.

Table 3b. LUCA 99 participants by region of the United States (American Indian and Alaska Native governmental units)

Region	Eligible Governmental Units	Participants (% of eligible)	Block Challengers (% of eligible)
West	194	48.45	25.26
Midwest	50	68.00	32.00
Northeast	10	30.00	30.00
South	33	48.48	9.09
Total	287	51.22	24.74

American Indian and Alaska Native governments in the Midwest had the largest rate of

participation with 68 percent. About 48 percent of governments in the West and the South participated. However, the percentage of governments in the South that challenged any blocks was much lower than other regions.

To get an idea of the size of governments that participated in the LUCA 99 program we look at participation by the number of housing units the government had in the 1990 Census. Close to 74 percent of governments eligible to participate in LUCA 99 had fewer than 1,000 housing units in 1990. Table 4 shows the percentage of eligible governments that participated and the percent that challenged blocks in different size governments.

Table 4. LUCA 99 participation by 1990 Census housing unit count

Housing unit count	Eligible Governmental Units*	Participants (% of eligible)	Block Challengers (% of eligible)
0 - 999	22,215	30.91	15.67
0 - 99	6,593	18.99	9.12
100 - 249	5,946	30.58	16.08
250 - 499	5,159	37.84	20.12
500 - 999	4,517	40.82	19.61
1,000 - 9,999	6,086	47.93	20.97
10,000 - 99,999	1,614	55.08	23.79
100,000 +	171	60.82	35.67
100,000 - 249,999	119	55.46	30.25
250,000 - 499,999	38	71.05	47.37
500,000 - 999,999	11	72.73	45.45
1,000,000 +	3	100.00	66.67
Total**	30,086	35.82	17.29

*This table does not include American Indian and Alaska Native governments.

**Two governments did not exist in 1990 and do not have 1990 housing unit counts associated with them.

As can be seen in Table 4, among all of the eligible governments, participation rates increase as the number of housing units in the governments increases. Smaller governments may have participated at a lower rate because they were aware of a larger government that was participating and comparing counts for blocks in their area. The percentage of governments that challenged blocks follows a similar pattern, only it reflects a smaller percentage of eligible governments.

All of the eligible American Indian and Alaska Native governments had fewer than 1,000 housing units in 1990.

Overall, in terms of participation, the LUCA 99 program met with some success. However, another goal of LUCA was to build relationships/partnerships with local and tribal governments

as part of the Census Partnership program. We were not able to make an independent assessment of that aspect of the program for this evaluation. Information pertaining to the success of the Partnership program in general (with limited LUCA specifics) can be found in the “Census 2000 Evaluation D.3: Report of Survey of Partners.”

Also, the Census Bureau contracted with Anteon Corporation to perform a survey of the local and tribal governments eligible for the Census 2000 LUCA programs. The survey focused on the governments’ experiences with the LUCA program and reasons for participation or non-participation. This report was produced independent of the official Census 2000 Evaluation memoranda.

4.2 How many addresses were on the address list before LUCA 99 Recanvass and what updates did field representatives make to them in the field?

As mentioned in section 4.1, LUCA 99 participants challenged 117,073 blocks. There were 2,222,338 addresses on the address list in the blocks sent to the LUCA 99 Recanvass operation in the U.S. and Puerto Rico combined. Field representatives canvassed the challenged blocks and either verified, corrected or deleted units on their lists.

The results of the LUCA 99 Recanvass operation for the 2,186,775 addresses we sent out in the U.S. are shown in Table 5a. Results for the 35,563 addresses we sent out in Puerto Rico are shown in Table 5b. Field representatives also added units they did not find on their list. The results for the number and characteristics of adds for the U.S. and Puerto Rico are in section 4.3.

Table 5a. LUCA 99 Recanvass results for addresses sent (U.S.)*

Action	Number of addresses	Percent of total
Verifications**	1,652,559	75.57
Deletes	141,843	6.49
Nonresidentials	3,535	0.16
Corrections	388,838	17.78
Total addresses sent to LUCA 99 Recanvass in the U.S.	2,186,775	100.00

*Units that field representatives added to their list are not included in this table. For the total number of adds and their characteristics, see section 4.3.

**656 of these addresses were sent out in LUCA 99 Recanvass and came back as added in the operation.

Field representatives in the U.S. verified that more than 75 percent of the addresses on the list existed as residential units in the specified block. They found that about 7 percent of the addresses did not exist in the specified block at all (or as a residential unit), and they made corrections to the remaining 17.8 percent of addresses on the list. For the results of the recanvass for each state see Appendix A.

Results for the LUCA 99 Recanvass operation in Puerto Rico differ slightly from U.S. results, as

shown in Table 5b.

Table 5b. Results for addresses sent to LUCA 99 Recanvass (Puerto Rico)*

Action	Number of addresses	Percent of total
Verifications**	33,029	92.87
Deletes	2,513	7.07
Nonresidentials	21	0.06
Corrections	0	0.00
Total addresses sent to LUCA 99 Recanvass in Puerto Rico	35,563	100.00

*Units that field representatives added to their list are not included in this table. For the total number of adds and their characteristics, see section 4.3.

**Six of these addresses were sent out in LUCA 99 Recanvass and came back as added in the operation.

Field representatives in Puerto Rico verified that over 92 percent of the addresses on the list existed as residential units in the specified block. They found that about 7 percent of the addresses did not exist in the specified block at all (or as a residential unit), and they did not make any corrections to any of the addresses on the list.

4.3 How many addresses did field representatives add in LUCA 99 Recanvass and what are their characteristics?

In addition to the verifications, deletes and corrections presented in section 4.2, LUCA 99 field representatives added⁷ a total of 338,048 addresses to their lists nationwide (U.S. and Puerto Rico). There were:

- ▶ 328,174 adds in the U.S.
- ▶ 9,874 adds in Puerto Rico

A number of states had over 20,000 adds, they include: Arizona, Georgia, North Carolina, South Carolina, and Texas. See Appendix B for the number of LUCA 99 Recanvass adds in each state.

The percent increase of addresses added (in the U.S. and Puerto Rico) relative to addresses already on the list and in blocks challenged by LUCA 99 participating governments is 15.21 percent (338,048 adds divided by 2,222,338 addresses already listed). The state level percentage

⁷ In Census 2000 address updating operations it is sometimes the case that field representatives “add” a unit in one block and “delete” the same unit from another block. We classify the combination of these two actions as a “move.” Files used for analysis did not allow us to identify moves in LUCA 99 Recanvass. However, we would like to mention that this scenario may not be as likely as it is in other operations because blocks that were recanvassed were less likely to be clustered geographically.

increases ranged from 5.6 percent in West Virginia to 36.7 percent in Nevada. See Appendix C for the percentage increase of adds for each state.

We profile the LUCA 99 Recanvass adds for the U.S. and Puerto Rico in the sections that follow. The profile will include the following characteristics:

- ▶ The clustering of adds in collection blocks (4.3.1)
- ▶ The type of address information currently reflected on the MAF for the adds (4.3.2)
- ▶ The number of units at the basic street address where the add is located (4.3.3)
- ▶ The type of enumeration area in which the add is currently located (4.3.4)
- ▶ Whether the block code for the add that was provided by the LUCA 99 Recanvass operation is the same as the current official block (4.3.5)
- ▶ The sources that originally placed the add on the address list (4.3.6)
- ▶ The number of adds that were delivered to the DMAF and in the final census (4.3.7)

4.3.1 Clustering of adds

There are 3,451,755 blocks in enumeration areas appropriate for LUCA 99. Approximately 3 percent of those blocks (110,728 total blocks)⁸ were included in LUCA 99 Recanvass operation and had at least one address updated (verified, deleted, declared nonresidential, corrected, or added) by field representatives. A total of 58,701 blocks had at least one unit added in the LUCA 99 Recanvass.

LUCA 99 Recanvass field representatives in the U.S. and Puerto Rico added 337,782 addresses in 58,701 blocks in TEAs 2, 5 and 9. The blocks represent about 53 percent of the blocks in LUCA 99 Recanvass and 1.7 percent of the 3,451,755 blocks in TEAs eligible for LUCA 99. Table 6 shows the total number of blocks (in TEAs 2, 5 and 9) with adds and the distribution of blocks by the number of adds.

⁸The number of blocks in the Recanvass stated here does not match the number of blocks challenged by LUCA 99 participants stated in section 4.1, since the previous number is not unduplicated across participating governmental units. Also, the number of blocks stated here does not include any blocks that governments challenged if the housing unit count was zero and field representatives did not find any addresses in the recanvass.

Table 6. LUCA 99 Recanvass range of adds in collection blocks (U.S. & Puerto Rico)*

Number of adds	Number of blocks with this many adds**	Percent of total blocks with adds
1	22,025	37.52
2-9	29,688	50.57
10-19	4,058	6.91
20-59	2,364	4.03
60-99	333	0.57
100+	233	0.40
Total blocks with adds (U.S. & Puerto Rico)	58,701	100.00

* This table is based on collection geography. See the Methods Section 2.3 for more details.

** Adds were limited to those in TEAs eligible for LUCA 99. For a distribution of adds by TEA, see section 4.3.4.

The majority of blocks with adds had fewer than ten adds. About 38 percent of blocks with adds had a single add, and about 51 percent had between 2 and 9 adds. The small number of adds in blocks is likely explained by the fact that these TEAs are rural areas of the country and often have housing units that are geographically spread apart.

4.3.2 Type of address information

We classified addresses into different categories indicating whether they had complete city-style address information, complete rural route information, complete P.O. box information, or had incomplete or missing address information on the MAF. We also considered whether they had a location description. See the Methods section 2.7 for more details. Table 7a shows the distribution of LUCA 99 Recanvass adds for the U.S. by their type of address information.

Table 7a. LUCA 99 Recanvass adds by type of address information (U.S.)

Type of Address Information	Number of adds	Percent of total
Complete City-style	260,431	79.36
With location description	16,028	4.88
Without location description	244,403	74.47
Complete Rural Route	8,983	2.74
With location description	8,448	2.57
Without location description	535	0.16
Complete P.O. Box	6,185	1.88
With location description	5,712	1.74
Without location description	473	0.14
Incomplete address information	4,065	1.24
With location description	1,713	0.52
Without location description	2,352	0.72
No address information	48,510	14.78
With location description	47,877	14.59
Without location description	633	0.19
Total adds in the U.S.	328,174	100.00

Almost 79 percent of adds in the U.S. had complete city-style address information⁹ although they are in non-city-style address areas. This likely made addresses in these areas easier for census field representatives to locate during the Update/Leave operation. About 15 percent of adds had no address information. However, these adds had location descriptions associated with them over 98 percent of the time. Therefore, along with a map spot, they should still be locatable by census field representatives.

The address information for adds in Puerto Rico differs from the U.S., as can be seen in Table 7b.

⁹ City-style address information consists of a house number and street name, 123 Main Street, for example.

Table 7b. LUCA 99 Recanvass adds by type of address information (Puerto Rico)

Type of Address Information	Number of adds	Percent of total**
Complete City-style*	0	0.00
Complete Rural Route	942	9.54
With location description	932	9.44
Without location description	10	0.10
Complete P.O. Box	745	7.55
With location description	741	7.50
Without location description	4	0.04
Incomplete address information	4	0.04
With location description	4	0.04
Without location description	0	0.00
No address information	8,183	82.87
With location description	8,181	82.85
Without location description	2	0.02
Total adds in Puerto Rico	9,874	100.00

*Due to the processing error described in section 3.4, there are no city-style addresses reflected on the MAF for Puerto Rico.

**Percentages do not sum to totals due to rounding

About 10 percent of adds in Puerto Rico had complete Rural Route information and about 8 percent had complete P.O. Box information. The majority (about 83 percent) had no address information. This and the fact that there are no adds with city-style address information in Puerto Rico is a result of the processing error described in section 3.4.

4.3.3 *Size of basic street address*

The size of basic street address is the number of units located at a basic street address. This variable was created on the MAF for units with city-style address information. Table 8 shows the adds by the number of units at the basic street address for the U.S.

Table 8. LUCA 99 Recanvass adds by size of basic street address (U.S.)

Size of basic street address	Number of adds	Percent of total
Single unit	262,895	80.11
Multi unit	65,279	19.89
2-4 units	29,540	9.00
5-9 units	5,529	1.68
10-19 units	6,015	1.83
20-49 units	8,487	2.59
50+ units	15,708	4.79
Total adds in the U.S.	328,174	100.00

Single units account for about 80 percent of the total LUCA 99 Recanvass adds in the U.S. In fact, single units account for at least 60 percent of the adds in most states. Connecticut and Hawaii are outliers, with single units accounting for about 51 percent and 40 percent of the adds in those states, respectively. The states of Arizona, California, Colorado, Georgia, Nevada, North Carolina, South Carolina, and Texas account for a large number of the adds (over 3,000 each) that were in multi-unit structures (see Appendix D). LUCA 99 Recanvass field representatives in those states likely found a number of whole multi-unit structures that they did not observe on their list.

All of the 9,874 adds in Puerto Rico were coded as single unit structures. Since the size of basic street address variable was only created for units with city-style address information, and there are no such units in Puerto Rico due to the processing error described in section 3.4, all the addresses were identified as single unit structures on the MAF. In reality, this is not the case.

4.3.4 Type of enumeration area

As previously mentioned, the LUCA 99 Recanvass operation occurred in TEAs 2 (Update/Leave), 5 (Rural Update/Enumerate) and 9 (Update/Leave from Mailout/Mailback). Table 9 shows the adds from the recanvass by the type of enumeration area.

Table 9. LUCA 99 Recanvass adds by type of enumeration area (U.S.)

Type of enumeration area	Number of adds	Percent of total*
Adds in TEAs <i>inappropriate</i> for the operation	266	0.08
Adds in TEAs <i>appropriate</i> for the operation	327,908	99.92
Update / Leave	308,459	93.99
Rural Update / Enumerate	17,866	5.44
Update/Leave from Mailout/Mailback	1,583	0.48
Total adds in the U.S.	328,174	100.00

* The subgroup percentages for appropriate TEAs do not sum to the total due to rounding.

More than 99 percent of adds were in the appropriate TEAs. The majority of the adds were in

Update/Leave areas, which cover more housing units than the other two TEAs. The state distributions also reflect over 99 percent of the adds in appropriate TEAs (see Appendix E). The 266 adds in TEAs inappropriate for the operation were likely added erroneously by LUCA 99 Recanvass field representatives who went outside their boundaries.

The 9,874 adds in Puerto Rico were all in Update/Leave areas since all of Puerto Rico is Update/Leave.

4.3.5 Block code agreement

One measure of the quality of LUCA 99 Recanvass adds is to compare the block code provided by the operation to the current official block code on the MAF. The number of adds that have a block code that agrees with the official block is clouded by the fact that the official collection block for a given unit may have been suffixed, and the operation was conducted in the unsuffixed block. Table 10a shows the extent that the block code provided by LUCA 99 Recanvass for each unit is considered the official block code on the MAF. We break down the instances where the block code disagrees by whether the block is a suffixed block.

Table 10a. LUCA 99 Recanvass adds by block code agreement (U.S.)

The block code provided by LUCA 99 Recanvass is...	Number of adds	Percent of total
Same as the official block	183,955	56.05
Different than the official block	462	0.14
Different than the official block, the unit is in a suffixed block	143,757	43.81
Total adds in the U.S.	328,174	100.00

All of the LUCA 99 Recanvass adds in the U.S. had a block code from the operation. About 56 percent of the adds have a block code that is the same as the official block code on the MAF. About 44 percent of the adds are in suffixed blocks and have a block code that disagrees with the current official block. We should not consider all of these true block disagreements since it is likely that an address was listed in the correct block during LUCA 99 Recanvass operation, but the block suffix was not used during listing.

There were 462 addresses recognized by the MAF as placed in the wrong block during LUCA 99 Recanvass. They may represent the following types of addresses:

- ▶ Addresses that received block code changes from the Update/Leave operation (which followed LUCA 99 Recanvass).
- ▶ Addresses that actually exist in a different block but were incorrectly listed by LUCA 99 Recanvass field representatives.

Unlike the U.S., all of the adds in Puerto Rico have block codes that agree with the official block

or the add is in a suffixed block. The results of the block code agreement for adds in Puerto Rico are shown in Table 10b.

Table 10b. LUCA 99 Recanvass adds by block code agreement (Puerto Rico)

The block code provided by LUCA 99 Recanvass is...	Number of adds	Percent of total*
Same as the official block	7,740	78.39
Different than the official block	0	0.00
Different than the official block, the unit is in a suffixed block	2,134	21.61
Total adds in Puerto Rico	7,740	100.00

All of the 9,874 adds in Puerto Rico had a block code from the operation. About 78 percent of the adds have a block code that is the same as the official block code on the MAF. About 22 percent of the adds are in suffixed blocks and have a block code that disagrees with the current official block.

4.3.6 Original Source

The operation that is identified as the original source of an address is the one that first placed the address on the MAF, given the address in a TEA appropriate for the operation. See section 2.5 for more details. Table 11 shows the LUCA 99 Recanvass adds by original source categories.

Table 11. LUCA 99 Recanvass adds by original source category (U.S.)

Original source*	Number of adds	Percent of total
Pre-LUCA 99	705	0.21
LUCA 99 Recanvass	327,241	99.72
Some other source	228	0.07
Total adds in the U.S.	328,174	100.00

*Refer to section 2.5 for a description of these collapsed original source categories.

Table 11 shows that the majority of addresses have an original source of LUCA 99 Recanvass. Those that have an original source of an operation that occurred before LUCA 99 (705 addresses) were on the MAF before the LUCA 99 Recanvass but were either:

- ▶ not assigned to a block or
- ▶ considered non-residential prior to being added by this operation.

The 228 addresses that have an original source from some other source reflect rare situations where the operation added units outside its boundaries, or areas that had boundary changes subsequent to the operation.

Every state (except Delaware and Pennsylvania) has at least 99 percent of the adds with an

original source of LUCA 99 Recanvass. Delaware and Pennsylvania are not far behind with about 98 percent.

All of the 9,874 adds in Puerto Rico have an original source of LUCA 99 Recanvass.

4.3.7 DMAF deliverability and final census status

The Decennial Master Address File (DMAF) is the file used for the delivery of census forms to respondents. An address on the MAF was DMAF deliverable if it was adequate to include in the census enumeration. The rules for determining the DMAF deliverability of an address were relatively complex. In general, the DMAF included MAF addresses that represented potential residential units that were geocoded to census blocks.

An address on the DMAF was assigned a status of "in the Census" if it was considered to be an existing housing unit at the end of all Census 2000 processes. Although there are errors (erroneously included or excluded units) in the census results, we suspect the magnitude of errors to be relatively small. Therefore, we believe we can get an indication of the quality of LUCA 99 Recanvass adds by looking at their final status in the census.

Tables 12 and 13 show the number of adds delivered to the DMAF and the number in the final census.

Table 12. LUCA 99 Recanvass adds by DMAF deliverability (U.S. & Puerto Rico)

State	Number of adds	Delivered to DMAF		Never delivered to DMAF	
		Number	Percent	Number	Percent
United States	328,174	326,363	99.45	1,811	0.55
Puerto Rico	9,874	9,871	99.97	3	0.03
Total adds	338,048	336,234	99.46	1,814	0.54

Addresses that GEO delivered to the DMAF were input to the Census 2000 process. Nearly all (99.46 percent) of the addresses added in Recanvass for the U.S. and Puerto Rico made it into the census process. The percentage of adds delivered to the DMAF was over 97 percent for all states (see Appendix F). Adds that GEO did not deliver to the DMAF likely did not have sufficient address information or a map spot. All addresses delivered to the DMAF were not included in the final census. For the final census status of adds, see Table 13 below.

Table 13. Final census status of LUCA 99 Recanvass adds (U.S. & Puerto Rico)

State	Number of adds	In the Census		Not in the Census	
		Number	Percent	Number	Percent
United States	328,174	280,503	85.47	47,671	14.53
Puerto Rico	9,874	7,525	76.21	2,349	23.79
Total adds	338,048	288,028	85.20	50,020	14.80

Over 85 percent of addresses LUCA 99 Recanvass adds were part of the final Census 2000 housing unit inventory. The result for Puerto Rico was a little lower at approximately 76 percent. The final census status of adds for the states ranged from over 92 percent in Connecticut, Hawaii, Maine, New Hampshire, and West Virginia to 66 percent in Delaware. See Appendix G for all state results.

A total of 50,020 adds were not in the final census housing unit inventory. Those adds were possibly one of the following:

- erroneously added by LUCA 99 Recanvass field representatives,
- demolished or made unfit for habitation before the census occurred, or
- a duplicate of another address

4.4 What are the characteristics of LUCA 99 Recanvass deletes?

We characterize all addresses that field representatives identified as “delete” or a “nonresidential” unit in the LUCA 99 Recanvass operation deletes in this section. LUCA Recanvass field representatives deleted a total of 147,912 addresses from their listing pages in the U.S. and Puerto Rico. Table 14 shows the number of “delete” actions and “nonresidential” actions as stated in section 4.2.

Table 14. Type of LUCA 99 Recanvass deletes (U.S. & Puerto Rico)

State	Number of deletes	Nonresidential actions		Delete actions	
		Number	Percent	Number	Percent
United States	145,378	3,535	2.43	141,843	97.57
Puerto Rico	2,534	21	0.83	2,513	99.17
Nation (U.S. & Puerto Rico)	147,912	3,556	2.40	144,356	97.60

There were a total of 145,378 LUCA 99 Recanvass deletes in the U.S. and 2,534 in Puerto Rico. As shown in Table 14, the majority of deletes in the U.S. and Puerto Rico were “delete” actions in the field. The field representative did not find the unit in the specified block and removed the unit from their address list. The remainder of the deletes were units the field representatives identified as nonresidential.

We profile the LUCA 99 Recanvass deletes for the U.S. and Puerto Rico in the sections that follow. The profile will include the following characteristics:

- The clustering of deletes in collection blocks (4.4.1)
- The type of address information currently reflected on the MAF for the deletes (4.4.2)
- The number of units at the basic street address where the delete is located (4.4.3)
- The type of enumeration area the delete is currently in (4.4.4)
- The sources that originally placed the delete on the address list (4.4.5)
- The number of deletes that were delivered to the DMAF and in the final census (4.4.6)

4.4.1 Clustering of deletes

As mentioned in section 4.3.1, there are 3,451,755 blocks in enumeration areas appropriate for LUCA 99. Approximately 3 percent of those blocks (110,728 total blocks)¹⁰ were included in LUCA 99 Recanvass operation and had at least one address updated (verified, deleted, determined nonresidential, corrected, or added) by field representatives. A total of 39,640 of those blocks had at least one unit deleted in LUCA 99 Recanvass.

LUCA 99 Recanvass field representatives in the U.S. and Puerto Rico deleted 145,527 addresses in 39,640 blocks in TEAs 2, 5 and 9. The blocks represent about 36 percent of the blocks in LUCA 99 Recanvass and about one percent of the 3,451,755 blocks in TEAs eligible for LUCA 99. Table 15 shows the total number of blocks (in TEAs 2, 5 and 9) with deletes and the distribution of blocks by the number of deletes.

¹⁰ The number of blocks in the Recanvass stated here does not match the number of blocks challenged by LUCA 99 participants stated in section 4.1. See section 4.3.1 for further explanation.

Table 15. LUCA 99 Recanvass range of deletes in collection blocks (U.S. and Puerto Rico)*

Number of deletes	Number of blocks with this many deletes**	Percent of total blocks with deletes
1	18,980	47.88
2-9	17,996	45.40
10-19	1,668	4.21
20-59	856	2.16
60-99	93	0.23
100+	47	0.12
Total blocks with deletes (U.S. & Puerto Rico)	39,640	100.00

* This table is based on collection geography. See the Methods Section 2.3 for more details.

** Deletes were limited to those in TEAs eligible for LUCA 99. For a distribution of deletes by TEA, see section 4.4.4.

The majority of blocks with deletes have less than 10 deletes. About 48 percent have a single delete in the block and about 45 percent have between 2 and 9 deletes in the block. We would not expect a high number of deletes per block in these rural areas since housing units in these areas are usually spread out.

4.4.2 Type of address information

Tables 16a and 16b present data for the type of address information for LUCA 99 Recanvass deletes in the U.S. and Puerto Rico.

Table 16a. LUCA 99 Recanvass deletes by type of address (U.S.)

Type of Address Information	Number of deletes	Percent of total
Complete City-style	107,994	74.28
With location description	12,475	8.58
Without location description	95,519	65.70
Complete Rural Route	3,656	2.51
With location description	3,375	2.32
Without location description	281	0.19
Complete P.O. Box	3,056	2.10
With location description	2,698	1.86
Without location description	358	0.25
Incomplete address information	3,224	2.22
With location description	280	0.19
Without location description	2,944	2.03
No address information	27,448	18.88
With location description	27,433	18.87
Without location description	15	0.01
Total deletes in the U.S.	145,378	100.00

About 74 percent of the deletes had city-style address information. City-style addresses are

generally easier to locate on the ground. Since a field representative deleted the address, it is likely that the unit did not exist in the block. About 19 percent of deletes did not have any address information, but most did have location descriptions. The states of Georgia and Texas accounted for a large number of deletes in the U.S. See Appendix H for the number of LUCA 99 Recanvass deletes by state.

Table 16b. LUCA 99 Recanvass deletes by type of address (Puerto Rico)*

Type of Address Information	Number of deletes	Percent of total
Complete City-style	0	0.00
Complete Rural Route	339	13.38
Complete P.O. Box	61	2.41
Incomplete address information	0	0.00
No address information	2,134	84.21
Total deletes in Puerto Rico	2,534	100.00

*All of the deletes in Puerto Rico had location description information in the address fields, so type of address categories are not broken into subgroups in this table.

There were no deletes with city style address information in Puerto Rico. Again this is due to the processing error described in section 3.4. The majority of the deletes (about 84 percent) appear to have no address information on the MAF. However, all of the addresses appear to have location descriptions.

4.4.3 Size of basic street address

Table 17 shows the range of units indicated on the MAF at the basic street address of the LUCA 99 Recanvass deletes.

Table 17. LUCA 99 Recanvass deletes by size of basic street address (U.S.)

Size of BSA	Number of deletes	Percent of total*
Single unit	124,651	85.74
Multi unit	20,727	14.26
2-4 units	8,956	6.16
5-9 units	2,595	1.79
10-19 units	2,178	1.50
20-49 units	3,471	2.39
50+ units	3,527	2.43
Total deletes in the U.S.	145,378	100.00

* Subgroup percentages for multi units do not sum to 14.26 due to rounding.

Single units account for nearly 86 percent of deletes. Other deletes result from single units being

deleted from multi-unit structures, or the deletion of whole multi-unit structures. We have no way of determining which of these situations was more likely.

All the deletes in Puerto Rico were single unit structures. Again, this is the case due to the processing error.

4.4.4 Type of enumeration area

Table 18. LUCA 99 Recanvass deletes by type of enumeration area (U.S.)

Type of enumeration area	Number of deletes	Percent of total
Deletes in TEAs inappropriate for the operation	2,385	1.64
Deletes in TEAs appropriate for the operation	142,993	98.36
Update / Leave	135,635	93.30
Rural Update / Enumerate	6,568	4.52
Update/Leave from Mailout/Mailback	790	0.54
Total deletes in the U.S.	145,378	100.00

Table 18 shows that the majority of deletes were in areas appropriate for the operation. This is as expected since the LUCA 99 operation took place in these areas and field representatives were not instructed to go beyond their assignment areas. Hence, if they did not find a unit in the specified block, they deleted it. Like the adds, the majority of deletes are in Update/Leave areas, which is the largest non-city-style enumeration area.

All of the 2,534 deletes in Puerto Rico were in Update/Leave areas since the whole country is assigned to the Update/Leave enumeration method.

4.4.5 Original Source

Table 19. LUCA 99 Recanvass deletes by original source category (U.S.)

Original source*	Number of deletes	Percent of total
Pre-LUCA 99	143,762	98.89
Address Listing	143,503	98.71
Census 2000 Dress Rehearsal	259	0.18
Some other source	1,616	1.11
Total deletes in the U.S.	145,378	100.00

* Refer to section 2.5 for a description of these collapsed original source categories

Table 19 shows that almost 99 percent of addresses deleted in LUCA 99 Recanvass were provided by Address Listing, which is the only previous operation in these areas besides Census 2000 Dress Rehearsal areas. The 1,616 other addresses were likely erroneously added to a block

in TEA 2, 5 or 9 by the Address Listing operation and correctly added to a valid block by an operation that did not occur in Update/Leave areas.

All of the units deleted in Puerto Rico were from the Address Listing operation.

4.4.6 DMAF deliverability and final census status

As previously described, the DMAF is the file used for the delivery of Census forms to respondents. An address on the DMAF was assigned a status of "in the Census" if it was considered to be an existing housing unit at the end of all Census 2000 processes. Although there are errors (erroneously included or excluded units) in the census results, we suspect the magnitude of errors to be relatively small. Therefore, we believe we can get an indication of the quality of LUCA 99 Recanvass deletes by looking at their final status in the census.

Table 20 shows the number of addresses that were deleted in LUCA 99 Recanvass, but were delivered to the DMAF. LUCA 99 deletes were not to be delivered to the initial DMAF, but some were delivered to the DMAF in later updates because:

- ▶ the TEA for an address changed
- ▶ the address was later successfully appealed by a LUCA participant, or
- ▶ a later operation added the unit back

Table 20. LUCA 99 Recanvass deletes by DMAF deliverability (U.S. & Puerto Rico)

State	Number of deletes	Delivered to DMAF		Never delivered to DMAF	
		Number	Percent	Number	Percent
United States	145,378	9,783	6.73	135,595	93.27
Puerto Rico	2,534	21	0.83	2,513	99.17
Nation (U.S. & Puerto Rico)	147,912	9,804	6.63	138,108	93.37

Nearly 7 percent of LUCA 99 Recanvass deletes in the U.S. were delivered to the DMAF, hence input to the census process. Puerto Rico had about 1 percent of deletes delivered. Not all addresses delivered to the DMAF were included in the final census. For final census status of deletes, see Table 21.

Table 21. Final census status of LUCA 99 Recanvass deletes (U.S. & Puerto Rico)

State	Number of deletes	In the Census		Not in the Census	
		Number	Percent	Number	Percent
United States	145,378	5,838	4.02	139,540	95.98
Puerto Rico	2,534	14	0.55	2,520	99.45
Nation (U.S. & Puerto Rico)	147,912	5,852	3.96	142,060	96.04

A total of 5,838 LUCA 99 Recanvass deletes in the U.S. (4 percent of total deletes) were

included in the final census. Fourteen were included in the final census in Puerto Rico. These were good addresses in the final census that LUCA 99 Recanvass field representatives were not able to find during the operation. See Appendix I for the number of deletes in the final census in each state.

4.5 What are the characteristics of LUCA 99 Recanvass corrections?

LUCA 99 Recanvass field representatives were instructed to correct address information on their list. They corrected a total of 388,838 addresses in the U.S. and none in Puerto Rico (see Appendix J). This section profiles those corrections. The profile will include the following characteristics:

- ▶ The clustering of corrections in collection blocks (4.5.1)
- ▶ The type of address information currently reflected on the MAF for the corrections (4.5.2)
- ▶ The number of units at the basic street address where the correction is located (4.5.3)
- ▶ The sources that originally placed the correction on the address list (4.5.4)

4.5.1 Clustering of corrections

There are 3,451,755 blocks in enumeration areas appropriate for LUCA 99. Approximately 3 percent of those blocks (110,728 total blocks)¹¹ were included in LUCA 99 Recanvass operation and had at least one address updated (verified, deleted, declared nonresidential, corrected, or added) by field representatives. A total of 60,677 blocks had at least one unit corrected in LUCA 99 Recanvass. Table 22 shows the total number of blocks with corrections and the distribution of blocks by the number of corrections.

Table 22. LUCA 99 Recanvass range of deletes in collection blocks (U.S.)*

Number of corrections	Number of blocks with this many corrections**	Percent of total blocks with corrections
1	18,013	29.69
2-9	32,300	53.23
10-19	6,435	10.61
20-59	3,443	5.67
60-99	336	0.55
100+	150	0.25
Total blocks with corrections in the U.S.	60,677	100.00

* This table is based on collection geography. See the Methods Section 2.3 for more details.

** Corrections were limited to those in TEAs eligible for LUCA 99.

Like the LUCA 99 Recanvass adds and deletes, the majority of blocks with corrections had fewer than 10 total corrections. About 11 percent of blocks had between 10 and 19 corrected units. This may indicate blocks with large multi-unit structures, since address corrections often involved correcting unit designations.

¹¹ The number of blocks in the Recanvass stated here does not match the number of blocks challenged by LUCA 99 participants stated in section 4.1. See section 4.3.1 for further explanation.

4.5.2 Type of address information

Table 23 shows the LUCA 99 corrections by the type of address information currently reflected on the MAF for the U.S.

Table 23. LUCA 99 Recanvass corrections by type of address information (U.S.)

Type of Address Information	Number of Corrections	Percent of total
Complete City-style	315,246	81.07
With location description	143,423	36.89
Without location description	171,823	44.19
Complete Rural Route	28,248	7.26
With location description	27,835	7.16
Without location description	413	0.11
Complete P.O. Box	15,049	3.87
With location description	14,496	3.73
Without location description	553	0.14
Incomplete address information	7,034	1.81
With location description	5,602	1.44
Without location description	1,432	0.37
No address information	23,261	5.98
With location description	23,190	5.96
Without location description	71	0.02
Total corrections in the U.S.	388,838	100.00

The majority of corrected addresses had city-style address information. Approximately 19 percent had other types of address information with location descriptions. Field representatives in LUCA 99 Recanvass likely added address information to improve these addresses and put them in the categories they are in now, but we have no way of determining the types of corrections they made.

4.5.3 Size of basic street address

Table 24 shows the number of corrections by the number of units at the basic street address for the U.S.

Table 24. LUCA 99 Recanvass corrections by size of basic street address (U.S.)

Size of BSA	Number of Corrections	Percent of total
Single unit	332,384	85.48
Multi unit	56,454	14.52
2-4 units	25,467	6.55
5-9 units	6,662	1.71
10-19 units	5,871	1.51
20-49 units	8,234	2.12
50+ units	10,220	2.63
Total corrections in the U.S.	388,838	100.00

Single unit structures account for over 85 percent of corrected units. The other 15 percent were made on addresses in multi-unit structures. These corrections were likely made to unit designations.

4.5.4 Original Source

Table 25 shows the number of LUCA 99 Recanvass corrections in the U.S. by the source that originally put them on the MAF.

Table 25. LUCA 99 Recanvass corrections by original source category (U.S.)

Original source	Number of Corrections	Percent of total
Pre-LUCA 99	388,678	99.96
Address Listing	388,540	99.92
Census 2000 Dress Rehearsal	138	0.04
Some other source	160	0.04
Total corrections in the U.S.	388,838	100.00

The majority of corrections were added by the Address Listing operation, which was the only operation besides the Census 2000 Dress Rehearsal to occur in TEAs 2, 5 and 9 before LUCA 99. The 160 corrected units that have some other source are incidental.

4.6 How many addresses did participants appeal and how many of them were in

the final census?

Local governments appealed a total of 18,442 addresses. All of those addresses were added to the MAF after approval by the Census Address List Appeals Office set up by the Office of Management and Budget. Approximately 54 percent (10,053) of the addresses appealed by local governments were included on the final Census address list.

4.7 What is the overall assessment of the LUCA 99 operations?

The address list for LUCA 99 areas (TEAs 2, 5, and 9) was created by the Census 2000 Address Listing operation. There were approximately 23,227,788 addresses from Address Listing (in the U.S. and Puerto Rico) that were geocoded with a mapspot and eligible for review in LUCA 99. Only addresses that were in LUCA 99 participant areas were actually sent to a local or tribal government for review.

About 36 percent of the 30,375 eligible governments participated in the Local Update of Census Addresses 99 program. The participating governments received review materials for addresses in their area. The total number of addresses that were to be reviewed by participants represented about 67.9 percent of the housing units in LUCA 99 eligible areas.¹²

There were approximately 3.5 million blocks in LUCA 99 eligible areas and only a portion of those blocks were reviewed by governments. About 17 percent of participating governments challenged blocks. Participants challenged a total of 110,728 blocks and the Census Bureau sent those blocks to the LUCA 99 Recanvass operation. About 79 percent of the challenged blocks yielded an address action that was either an add, delete or correction. Of the challenged blocks, about 53 percent of blocks yielded at least one add, 36 percent yielded at least one delete, and 55 percent yielded at least one correction.

The LUCA 99 program aided in updating the address list in some areas. As a result of the recanvass of challenged blocks, field representatives added 338,048 addresses, deleted 147,912 addresses, and corrected 388,838 addresses in the U.S. and Puerto Rico. About 85.2 percent of the added addresses were in the final census housing unit inventory. Given these results, it seems plausible that additional local and tribal governments would have benefitted from participating in the LUCA 99 program. **We recommend that the Census Bureau continue to pursue LUCA-type programs in non-city-style address areas for future censuses and tests. Also, the Census Bureau should investigate ways to increase government participation in the LUCA programs.**

¹² The 67.9 percent coverage is an approximation from independent GEO files and was not based on the number of addresses in LUCA 99 areas (from Address Listing with a mapspot on the MAF extract evaluation files) provided earlier.

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Appendix A: LUCA 99 Recanvass actions for addresses sent

State	Number of addresses sent to Recanvass	Recanvass action (percent of addresses sent)			
		Verified	Deleted	Determined Nonresidential	Corrected
Alabama	33,555	76.52	7.18	0.13	16.17
Alaska	6,288	54.06	10.62	0.40	34.92
Arizona	73,303	68.55	7.86	0.14	23.44
Arkansas	96,593	81.55	4.79	0.12	13.55
California	80,500	80.18	6.25	0.14	13.44
Colorado	76,861	74.40	5.27	0.20	20.12
Connecticut	7,770	79.24	3.78	0.01	16.96
Delaware	454	77.75	0.22	0.22	21.81
District of Columbia	---	---	---	---	---
Florida	44,848	75.95	7.20	0.10	16.76
Georgia	253,135	80.76	5.95	0.15	13.14
Hawaii	5,685	70.45	17.80	0.14	11.61
Idaho	9,072	69.09	8.56	0.23	22.11
Illinois	27,907	75.30	5.53	0.20	18.98
Indiana	12,920	74.68	4.67	0.22	20.43
Iowa	65,945	84.93	4.65	0.16	10.27
Kansas	23,346	75.16	5.89	0.25	18.69
Kentucky	9,877	77.19	4.80	0.15	17.86
Louisiana	30,859	79.91	5.73	0.10	14.26
Maine	16,863	64.17	4.93	0.11	30.79
Maryland	28,134	80.42	4.38	0.22	14.97
Massachusetts	5,055	76.04	5.38	0.53	18.04
Michigan	82,432	78.80	4.46	0.12	16.63
Minnesota	62,054	64.20	5.55	0.14	30.12
Mississippi	29,703	58.86	13.69	0.22	27.23
Missouri	45,350	73.12	4.56	0.15	22.16
Montana	16,653	81.42	5.83	0.07	12.68
Nebraska	11,171	69.94	5.15	0.19	24.72
Nevada	53,080	85.82	3.65	0.15	10.39
New Hampshire	7,866	64.84	7.07	0.14	27.96
New Jersey	9,673	85.59	5.29	0.10	9.01
New Mexico	26,563	64.39	7.52	0.17	27.92
New York	72,025	77.32	7.44	0.11	15.13
North Carolina	205,703	81.71	4.86	0.16	13.26
North Dakota	12,804	71.70	8.38	0.16	19.75
Ohio	30,710	73.04	4.17	0.27	22.52
Oklahoma	18,644	67.13	11.35	0.36	21.16
Oregon	19,086	82.28	5.15	0.15	12.43
Pennsylvania	108,352	67.75	6.44	0.13	25.68
Rhode Island	---	---	---	---	---
South Carolina	109,569	69.74	10.08	0.22	19.97
South Dakota	15,807	76.78	6.70	0.18	16.33
Tennessee	48,742	78.97	5.94	0.13	14.96
Texas	162,666	65.66	10.27	0.18	23.89
Utah	12,548	79.64	5.07	0.06	15.24
Vermont	5,018	45.34	9.80	0.08	44.78
Virginia	51,083	81.28	6.98	0.26	11.48
Washington	12,644	70.29	9.28	0.20	20.23
West Virginia	7,215	78.10	3.62	0.10	18.18
Wisconsin	35,982	78.49	5.93	0.18	15.40
Wyoming	4,662	73.49	4.14	0.11	22.27
Puerto Rico	35,563	92.87	7.07	0.06	0.00
Nation (U.S. & Puerto Rico)	2,222,338	75.85	6.50	0.16	17.50

— The District of Columbia was not eligible to participate since it has no Update/Leave areas. Rhode Island had one participant that did not challenge any blocks, hence there were no blocks sent to recanvass.

Appendix B: LUCA 99 Recanvass adds by State

State	Number of adds	Percent of national total
Alabama	4,523	1.34
Alaska	1,077	0.32
Arizona	24,979	7.39
Arkansas	9,805	2.90
California	14,586	4.31
Colorado	16,152	4.78
Connecticut	460	0.14
Delaware	145	0.04
District of Columbia	0	0.00
Florida	8,336	2.47
Georgia	30,426	9.00
Hawaii	1,261	0.37
Idaho	2,340	0.69
Illinois	3,006	0.89
Indiana	1,154	0.34
Iowa	6,426	1.90
Kansas	3,021	0.89
Kentucky	1,264	0.37
Louisiana	3,473	1.03
Maine	1,810	0.54
Maryland	2,299	0.68
Massachusetts	450	0.13
Michigan	8,072	2.39
Minnesota	9,096	2.69
Mississippi	5,569	1.65
Missouri	4,256	1.26
Montana	2,159	0.64
Nebraska	1,559	0.46
Nevada	19,497	5.77
New Hampshire	1,116	0.33
New Jersey	1,365	0.40
New Mexico	4,286	1.27
New York	10,725	3.17
North Carolina	23,723	7.02
North Dakota	2,486	0.74
Ohio	2,492	0.74
Oklahoma	3,444	1.02
Oregon	2,523	0.75
Pennsylvania	17,481	5.17
Rhode Island	0	0.00
South Carolina	21,508	6.36
South Dakota	2,153	0.64
Tennessee	5,241	1.55
Texas	26,273	7.77
Utah	2,145	0.63
Vermont	732	0.22
Virginia	5,725	1.69
Washington	2,184	0.65
West Virginia	405	0.12
Wisconsin	4,250	1.26
Wyoming	716	0.21
Puerto Rico	9,874	2.92
Nation (U.S. & Puerto Rico)	338,048	100.00

Appendix C: Adds as a percentage of the initial LUCA 99 Recanvass universe

State	Addresses on the list before the Recanvass	Number of adds	Percentage increase of adds
Alabama	33,555	4,523	13.48
Alaska	6,288	1,077	17.13
Arizona	73,303	24,979	34.08
Arkansas	96,593	9,805	10.15
California	80,500	14,586	18.12
Colorado	76,861	16,152	21.01
Connecticut	7,770	460	5.92
Delaware	454	145	31.94
District of Columbia	0	0	0.00
Florida	44,848	8,336	18.59
Georgia	253,135	30,426	12.02
Hawaii	5,685	1,261	22.18
Idaho	9,072	2,340	25.79
Illinois	27,907	3,006	10.77
Indiana	12,920	1,154	8.93
Iowa	65,945	6,426	9.74
Kansas	23,346	3,021	12.94
Kentucky	9,877	1,264	12.80
Louisiana	30,859	3,473	11.25
Maine	16,863	1,810	10.73
Maryland	28,134	2,299	8.17
Massachusetts	5,055	450	8.90
Michigan	82,432	8,072	9.79
Minnesota	62,054	9,096	14.66
Mississippi	29,703	5,569	18.75
Missouri	45,350	4,256	9.38
Montana	16,653	2,159	12.96
Nebraska	11,171	1,559	13.96
Nevada	53,080	19,497	36.73
New Hampshire	7,866	1,116	14.19
New Jersey	9,673	1,365	14.11
New Mexico	26,563	4,286	16.14
New York	72,025	10,725	14.89
North Carolina	205,703	23,723	11.53
North Dakota	12,804	2,486	19.42
Ohio	30,710	2,492	8.11
Oklahoma	18,644	3,444	18.47
Oregon	19,086	2,523	13.22
Pennsylvania	108,352	17,481	16.13
Rhode Island	0	0	0.00
South Carolina	109,569	21,508	19.63
South Dakota	15,807	2,153	13.62
Tennessee	48,742	5,241	10.75
Texas	162,666	26,273	16.15
Utah	12,548	2,145	17.09
Vermont	5,018	732	14.59
Virginia	51,083	5,725	11.21
Washington	12,644	2,184	17.27
West Virginia	7,215	405	5.61
Wisconsin	35,982	4,250	11.81
Wyoming	4,662	716	15.36
Puerto Rico	35,563	9,874	27.76
Nation (U.S. & Puerto Rico)	2,222,338	338,048	15.21

Appendix D: LUCA 99 Recanvass adds by size of basic street address

State	Number of adds	Single-Unit structures		Multi-Unit Structures	
		Number	Percent	Number	Percent
Alabama	4,523	3,603	79.66	920	20.34
Alaska	1,077	794	73.72	283	26.28
Arizona	24,979	19,392	77.63	5,587	22.37
Arkansas	9,805	7,822	79.78	1,983	20.22
California	14,586	11,115	76.20	3,471	23.80
Colorado	16,152	10,720	66.37	5,432	33.63
Connecticut	460	236	51.30	224	48.70
Delaware	145	137	94.48	8	5.52
District of Columbia	0	0	0.00	0	0.00
Florida	8,336	5,645	67.72	2,691	32.28
Georgia	30,426	26,139	85.91	4,287	14.09
Hawaii	1,261	510	40.44	751	59.56
Idaho	2,340	2,055	87.82	285	12.18
Illinois	3,006	2,488	82.77	518	17.23
Indiana	1,154	918	79.55	236	20.45
Iowa	6,426	4,898	76.22	1,528	23.78
Kansas	3,021	2,209	73.12	812	26.88
Kentucky	1,264	934	73.89	330	26.11
Louisiana	3,473	3,054	87.94	419	12.06
Maine	1,810	1,552	85.75	258	14.25
Maryland	2,299	1,897	82.51	402	17.49
Massachusetts	450	310	68.89	140	31.11
Michigan	8,072	6,656	82.46	1,416	17.54
Minnesota	9,096	7,798	85.73	1,298	14.27
Mississippi	5,569	4,836	86.84	733	13.16
Missouri	4,256	3,656	85.90	600	14.10
Montana	2,159	1,569	72.67	590	27.33
Nebraska	1,559	1,241	79.60	318	20.40
Nevada	19,497	15,330	78.63	4,167	21.37
New Hampshire	1,116	760	68.10	356	31.90
New Jersey	1,365	1,212	88.79	153	11.21
New Mexico	4,286	3,915	91.34	371	8.66
New York	10,725	8,199	76.45	2,526	23.55
North Carolina	23,723	20,141	84.90	3,582	15.10
North Dakota	2,486	1,502	60.42	984	39.58
Ohio	2,492	1,950	78.25	542	21.75
Oklahoma	3,444	2,928	85.02	516	14.98
Oregon	2,523	2,021	80.10	502	19.90
Pennsylvania	17,481	15,907	91.00	1,574	9.00
Rhode Island	0	0	0.00	0	0.00
South Carolina	21,508	17,168	79.82	4,340	20.18
South Dakota	2,153	1,539	71.48	614	28.52
Tennessee	5,241	4,215	80.42	1,026	19.58
Texas	26,273	21,808	83.01	4,465	16.99
Utah	2,145	1,631	76.04	514	23.96
Vermont	732	560	76.50	172	23.50
Virginia	5,725	4,453	77.78	1,272	22.22
Washington	2,184	1,683	77.06	501	22.94
West Virginia	405	257	63.46	148	36.54
Wisconsin	4,250	3,009	70.80	1,241	29.20
Wyoming	716	523	73.04	193	26.96
Puerto Rico	9,874	9,874	100.00	0	0.00
Nation (U.S. & Puerto Rico)	338,048	272,769	80.69	65,279	19.31

Appendix E: LUCA 99 Recanvass adds by Type of Enumeration Area

State	Number of adds	Appropriate TEAs		Inappropriate TEAs	
		Number	Percent	Number	Percent
Alabama	4,523	4,523	100.00	0	0.00
Alaska	1,077	1,077	100.00	0	0.00
Arizona	24,979	24,969	99.96	10	0.04
Arkansas	9,805	9,769	99.63	36	0.37
California	14,586	14,551	99.76	35	0.24
Colorado	16,152	16,148	99.98	4	0.02
Connecticut	460	460	100.00	0	0.00
Delaware	145	145	100.00	0	0.00
District of Columbia	0	0	0.00	0	0.00
Florida	8,336	8,330	99.93	6	0.07
Georgia	30,426	30,415	99.96	11	0.04
Hawaii	1,261	1,261	100.00	0	0.00
Idaho	2,340	2,336	99.83	4	0.17
Illinois	3,006	3,001	99.83	5	0.17
Indiana	1,154	1,152	99.83	2	0.17
Iowa	6,426	6,413	99.80	13	0.20
Kansas	3,021	3,000	99.30	21	0.70
Kentucky	1,264	1,264	100.00	0	0.00
Louisiana	3,473	3,471	99.94	2	0.06
Maine	1,810	1,810	100.00	0	0.00
Maryland	2,299	2,299	100.00	0	0.00
Massachusetts	450	450	100.00	0	0.00
Michigan	8,072	8,069	99.96	3	0.04
Minnesota	9,096	9,088	99.91	8	0.09
Mississippi	5,569	5,566	99.95	3	0.05
Missouri	4,256	4,254	99.95	2	0.05
Montana	2,159	2,159	100.00	0	0.00
Nebraska	1,559	1,556	99.81	3	0.19
Nevada	19,497	19,487	99.95	10	0.05
New Hampshire	1,116	1,116	100.00	0	0.00
New Jersey	1,365	1,363	99.85	2	0.15
New Mexico	4,286	4,286	100.00	0	0.00
New York	10,725	10,724	99.99	1	0.01
North Carolina	23,723	23,718	99.98	5	0.02
North Dakota	2,486	2,485	99.96	1	0.04
Ohio	2,492	2,488	99.84	4	0.16
Oklahoma	3,444	3,443	99.97	1	0.03
Oregon	2,523	2,520	99.88	3	0.12
Pennsylvania	17,481	17,468	99.93	13	0.07
Rhode Island	0	0	0.00	0	0.00
South Carolina	21,508	21,491	99.92	17	0.08
South Dakota	2,153	2,150	99.86	3	0.14
Tennessee	5,241	5,237	99.92	4	0.08
Texas	26,273	26,252	99.92	21	0.08
Utah	2,145	2,144	99.95	1	0.05
Vermont	732	731	99.86	1	0.14
Virginia	5,725	5,721	99.93	4	0.07
Washington	2,184	2,182	99.91	2	0.09
West Virginia	405	405	100.00	0	0.00
Wisconsin	4,250	4,245	99.88	5	0.12
Wyoming	716	716	100.00	0	0.00
Puerto Rico	9,874	9,874	100.00	0	0.00
Nation (U.S. & Puerto Rico)	338,048	337,782	99.92	266	0.08

Appendix F: LUCA 99 Recanvass adds by DMAF deliverability

State	Number of adds	Delivered to DMAF		Never delivered to DMAF	
		Number	Percent	Number	Percent
Alabama	4,523	4,522	99.98	1	0.02
Alaska	1,077	1,077	100.00	0	0.00
Arizona	24,979	24,903	99.70	76	0.30
Arkansas	9,805	9,800	99.95	5	0.05
California	14,586	14,389	98.65	197	1.35
Colorado	16,152	15,730	97.39	422	2.61
Connecticut	460	460	100.00	0	0.00
Delaware	145	145	100.00	0	0.00
District of Columbia	0	0	0.00	0	0.00
Florida	8,336	8,325	99.87	11	0.13
Georgia	30,426	30,330	99.68	96	0.32
Hawaii	1,261	1,261	100.00	0	0.00
Idaho	2,340	2,339	99.96	1	0.04
Illinois	3,006	3,001	99.83	5	0.17
Indiana	1,154	1,152	99.83	2	0.17
Iowa	6,426	6,403	99.64	23	0.36
Kansas	3,021	3,013	99.74	8	0.26
Kentucky	1,264	1,264	100.00	0	0.00
Louisiana	3,473	3,472	99.97	1	0.03
Maine	1,810	1,810	100.00	0	0.00
Maryland	2,299	2,296	99.87	3	0.13
Massachusetts	450	450	100.00	0	0.00
Michigan	8,072	8,064	99.90	8	0.10
Minnesota	9,096	8,850	97.30	246	2.70
Mississippi	5,569	5,566	99.95	3	0.05
Missouri	4,256	4,244	99.72	12	0.28
Montana	2,159	2,155	99.81	4	0.19
Nebraska	1,559	1,557	99.87	2	0.13
Nevada	19,497	19,496	99.99	1	0.01
New Hampshire	1,116	1,115	99.91	1	0.09
New Jersey	1,365	1,365	100.00	0	0.00
New Mexico	4,286	4,261	99.42	25	0.58
New York	10,725	10,552	98.39	173	1.61
North Carolina	23,723	23,664	99.75	59	0.25
North Dakota	2,486	2,484	99.92	2	0.08
Ohio	2,492	2,489	99.88	3	0.12
Oklahoma	3,444	3,410	99.01	34	0.99
Oregon	2,523	2,522	99.96	1	0.04
Pennsylvania	17,481	17,227	98.55	254	1.45
Rhode Island	0	0	0.00	0	0.00
South Carolina	21,508	21,487	99.90	21	0.10
South Dakota	2,153	2,152	99.95	1	0.05
Tennessee	5,241	5,237	99.92	4	0.08
Texas	26,273	26,195	99.70	78	0.30
Utah	2,145	2,144	99.95	1	0.05
Vermont	732	732	100.00	0	0.00
Virginia	5,725	5,714	99.81	11	0.19
Washington	2,184	2,181	99.86	3	0.14
West Virginia	405	405	100.00	0	0.00
Wisconsin	4,250	4,238	99.72	12	0.28
Wyoming	716	715	99.86	1	0.14
Puerto Rico	9,874	9,871	99.97	3	0.03
Nation (U.S. & Puerto Rico)	338,048	336,234	99.46	1,814	0.54

Appendix G: Final census status of LUCA 99 Recanvass adds

State	Number of adds	In Census		Not in Census	
		Number	Percent	Number	Percent
Alabama	4,523	3,961	87.57	562	12.43
Alaska	1,077	914	84.87	163	15.13
Arizona	24,979	20,650	82.67	4,329	17.33
Arkansas	9,805	8,431	85.99	1,374	14.01
California	14,586	12,241	83.92	2,345	16.08
Colorado	16,152	13,365	82.75	2,787	17.25
Connecticut	460	426	92.61	34	7.39
Delaware	145	96	66.21	49	33.79
District of Columbia	0	0	0.00	0	0.00
Florida	8,336	7,233	86.77	1,103	13.23
Georgia	30,426	25,782	84.74	4,644	15.26
Hawaii	1,261	1,170	92.78	91	7.22
Idaho	2,340	1,898	81.11	442	18.89
Illinois	3,006	2,702	89.89	304	10.11
Indiana	1,154	1,000	86.66	154	13.34
Iowa	6,426	5,679	88.38	747	11.62
Kansas	3,021	2,700	89.37	321	10.63
Kentucky	1,264	1,099	86.95	165	13.05
Louisiana	3,473	2,930	84.37	543	15.63
Maine	1,810	1,669	92.21	141	7.79
Maryland	2,299	1,923	83.65	376	16.35
Massachusetts	450	391	86.89	59	13.11
Michigan	8,072	6,936	85.93	1,136	14.07
Minnesota	9,096	7,901	86.86	1,195	13.14
Mississippi	5,569	4,972	89.28	597	10.72
Missouri	4,256	3,642	85.57	614	14.43
Montana	2,159	1,807	83.70	352	16.30
Nebraska	1,559	1,343	86.14	216	13.86
Nevada	19,497	17,202	88.23	2,295	11.77
New Hampshire	1,116	1,034	92.65	82	7.35
New Jersey	1,365	1,063	77.88	302	22.12
New Mexico	4,286	3,147	73.43	1,139	26.57
New York	10,725	9,240	86.15	1,485	13.85
North Carolina	23,723	20,539	86.58	3,184	13.42
North Dakota	2,486	2,228	89.62	258	10.38
Ohio	2,492	2,139	85.83	353	14.17
Oklahoma	3,444	2,784	80.84	660	19.16
Oregon	2,523	2,106	83.47	417	16.53
Pennsylvania	17,481	14,294	81.77	3,187	18.23
Rhode Island	0	0	0	0	0
South Carolina	21,508	18,714	87.01	2,794	12.99
South Dakota	2,153	1,885	87.55	268	12.45
Tennessee	5,241	4,418	84.30	823	15.70
Texas	26,273	22,923	87.25	3,350	12.75
Utah	2,145	1,612	75.15	533	24.85
Vermont	732	633	86.48	99	13.52
Virginia	5,725	5,117	89.38	608	10.62
Washington	2,184	1,878	85.99	306	14.01
West Virginia	405	374	92.35	31	7.65
Wisconsin	4,250	3,762	88.52	488	11.48
Wyoming	716	550	76.82	166	23.18
Puerto Rico	9,874	7,525	76.21	2,349	23.79
Nation (U.S. & Puerto Rico)	338,048	288,028	85.20	50,020	14.80

Appendix H: LUCA 99 Recanvass deletes by state

State	Number of deletes	Percent of national total
Alabama	2,452	1.66
Alaska	693	0.47
Arizona	5,867	3.97
Arkansas	4,739	3.20
California	5,139	3.47
Colorado	4,207	2.84
Connecticut	295	0.20
Delaware	2	0.00
District of Columbia	0	0.00
Florida	3,271	2.21
Georgia	15,455	10.45
Hawaii	1,020	0.69
Idaho	798	0.54
Illinois	1,598	1.08
Indiana	631	0.43
Iowa	3,169	2.14
Kansas	1,435	0.97
Kentucky	489	0.33
Louisiana	1,800	1.22
Maine	850	0.57
Maryland	1,295	0.88
Massachusetts	299	0.20
Michigan	3,771	2.55
Minnesota	3,528	2.39
Mississippi	4,131	2.79
Missouri	2,139	1.45
Montana	982	0.66
Nebraska	596	0.40
Nevada	2,012	1.36
New Hampshire	567	0.38
New Jersey	522	0.35
New Mexico	2,043	1.38
New York	5,438	3.68
North Carolina	10,342	6.99
North Dakota	1,094	0.74
Ohio	1,363	0.92
Oklahoma	2,184	1.48
Oregon	1,010	0.68
Pennsylvania	7,124	4.82
Rhode Island	0	0.00
South Carolina	11,282	7.63
South Dakota	1,088	0.74
Tennessee	2,958	2.00
Texas	16,999	11.49
Utah	643	0.43
Vermont	496	0.34
Virginia	3,701	2.50
Washington	1,198	0.81
West Virginia	268	0.18
Wisconsin	2,197	1.49
Wyoming	198	0.13
Puerto Rico	2,534	1.71
Nation (U.S. & Puerto Rico)	147,912	100.00

Appendix I: Final census status of LUCA 99 Recanvass deletes

State	Number of deletes	In the Census		Not in the Census	
		Number	Percent	Number	Percent
Alabama	2,452	90	3.67	2,362	96.33
Alaska	693	10	1.44	683	98.56
Arizona	5,867	176	3.00	5,691	97.00
Arkansas	4,739	298	6.29	4,441	93.71
California	5,139	194	3.78	4,945	96.22
Colorado	4,207	97	2.31	4,110	97.69
Connecticut	295	1	0.34	294	99.66
Delaware	2	0	0.00	2	100.00
District of Columbia	0	0	0.00	0	0.00
Florida	3,271	60	1.83	3,211	98.17
Georgia	15,455	320	2.07	15,135	97.93
Hawaii	1,020	19	1.86	1,001	98.14
Idaho	798	21	2.63	777	97.37
Illinois	1,598	56	3.50	1,542	96.50
Indiana	631	26	4.12	605	95.88
Iowa	3,169	147	4.64	3,022	95.36
Kansas	1,435	54	3.76	1,381	96.24
Kentucky	489	13	2.66	476	97.34
Louisiana	1,800	181	10.06	1,619	89.94
Maine	850	11	1.29	839	98.71
Maryland	1,295	66	5.10	1,229	94.90
Massachusetts	299	18	6.02	281	93.98
Michigan	3,771	131	3.47	3,640	96.53
Minnesota	3,528	136	3.85	3,392	96.15
Mississippi	4,131	186	4.50	3,945	95.50
Missouri	2,139	64	2.99	2,075	97.01
Montana	982	18	1.83	964	98.17
Nebraska	596	18	3.02	578	96.98
Nevada	2,012	183	9.10	1,829	90.90
New Hampshire	567	10	1.76	557	98.24
New Jersey	522	49	9.39	473	90.61
New Mexico	2,043	42	2.06	2,001	97.94
New York	5,438	94	1.73	5,344	98.27
North Carolina	10,342	458	4.43	9,884	95.57
North Dakota	1,094	13	1.19	1,081	98.81
Ohio	1,363	68	4.99	1,295	95.01
Oklahoma	2,184	120	5.49	2,064	94.51
Oregon	1,010	34	3.37	976	96.63
Pennsylvania	7,124	385	5.40	6,739	94.60
Rhode Island	0	0	0.00	0	0.00
South Carolina	11,282	1,104	9.79	10,178	90.21
South Dakota	1,088	53	4.87	1,035	95.13
Tennessee	2,958	79	2.67	2,879	97.33
Texas	16,999	472	2.78	16,527	97.22
Utah	643	25	3.89	618	96.11
Vermont	496	14	2.82	482	97.18
Virginia	3,701	105	2.84	3,596	97.16
Washington	1,198	50	4.17	1,148	95.83
West Virginia	268	7	2.61	261	97.39
Wisconsin	2,197	45	2.05	2,152	97.95
Wyoming	198	17	8.59	181	91.41
Puerto Rico	2,534	14	0.55	2,520	99.45
Nation (U.S. & Puerto Rico)	147,912	5,852	3.96	142,060	96.04

Appendix J: LUCA 99 Recanvass corrections by state

State	Number of corrections	Percent of national total
Alabama	5,426	1.40
Alaska	2,196	0.56
Arizona	17,185	4.42
Arkansas	13,084	3.36
California	10,820	2.78
Colorado	15,466	3.98
Connecticut	1,318	0.34
Delaware	99	0.03
District of Columbia	0	0.00
Florida	7,515	1.93
Georgia	33,257	8.55
Hawaii	660	0.17
Idaho	2,006	0.52
Illinois	5,296	1.36
Indiana	2,640	0.68
Iowa	6,771	1.74
Kansas	4,363	1.12
Kentucky	1,764	0.45
Louisiana	4,401	1.13
Maine	5,192	1.34
Maryland	4,213	1.08
Massachusetts	912	0.23
Michigan	13,708	3.53
Minnesota	18,689	4.81
Mississippi	8,088	2.08
Missouri	10,049	2.58
Montana	2,112	0.54
Nebraska	2,762	0.71
Nevada	5,514	1.42
New Hampshire	2,199	0.57
New Jersey	872	0.22
New Mexico	7,417	1.91
New York	10,895	2.80
North Carolina	27,276	7.01
North Dakota	2,529	0.65
Ohio	6,916	1.78
Oklahoma	3,945	1.01
Oregon	2,372	0.61
Pennsylvania	27,821	7.15
Rhode Island	0	0.00
South Carolina	21,877	5.63
South Dakota	2,582	0.66
Tennessee	7,291	1.88
Texas	38,868	10.00
Utah	1,912	0.49
Vermont	2,247	0.58
Virginia	5,862	1.51
Washington	2,558	0.66
West Virginia	1,312	0.34
Wisconsin	5,543	1.43
Wyoming	1,038	0.27
Puerto Rico	0	0.00
Nation (U.S. & Puerto Rico)	388,838	100.00