

**Final Status of Addresses on the Census 2000 Address List:
Analysis of the Address List-building Process**

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Abstract: Many addresses accepted onto the Census 2000 address list have had their status changed by the end of the Census. The status of some number of addresses was checked in such operations as Nonresponse Follow-up and Coverage Improvement Follow-up. In Update/Leave and Update/Enumerate areas, where questionnaires were delivered by hand, there was an additional address status check at the time of delivery. Thus, not all addresses on the initial Census 2000 address list were valid by the end of the Census. Additionally operations occurred during the Census that added addresses to the address list. This paper reports the initial analysis of the final status of addresses included on the Census 2000 address list by address list-building operation.

ADDRESS LIST OPERATIONS

In creating the address list for Census 2000, we managed diverse addressing systems and housing situations, as well as numerous logistical problems. We developed a number of paths for collecting addresses for housing units in advance of the census, in order to print the addresses on more than 100 million questionnaires before delivering those questionnaires. The Census Bureau maintains the housing unit addresses in its Master Address File (MAF).

Where possible, questionnaires were mailed. Otherwise questionnaires were delivered by hand. For Mailout/Mailback (MO/MB) and Update/Leave (U/L), the primary enumeration methodologies, we expected the respondents to return the questionnaires.

MO/MB Areas

The majority of addresses in the country are in the MO/MB areas, which in general are areas with a predominance of city-style addresses. A city-style address is of the type "121 Main Street." Operations and files to build the address list were selected on the basis of their potential to yield the best information about the status of housing units. For the MO/MB areas, the 1990 census address file, or the Address Control File (ACF) was the starting point for building the MAF. The first update to the MAF was the Delivery Sequence File (DSF) from the United States Postal Service (USPS).

The DSF is the USPS's address list of mail delivery points, updated every month. The Census Bureau selected certain DSFs for address updates throughout the address list-building process. After incorporating the November 1997 and the September 1998 DSFs into the MAF and determining block numbers for as many addresses on the MAF as possible, the Census Bureau performed an update of the address lists and a simultaneous update of the census maps in an operation called Block Canvassing. There was also a cooperative effort with participating Governmental Units (GUs) to update the address file. In the MO/MB areas this operation was called Local Update of Census Addresses 1998 (LUCA 1998). Block Canvassing and LUCA 1998 occurred in an overlapping time frame. Block Canvassing was a 100% canvass of the blocks in the MO/MB areas, while input from LUCA depended upon participation by GUs. In August 1999, we created the address list for the initial printing of Census 2000 questionnaires, based on the status of addresses from all the preceding operations.

Units with conflicting status from Block Canvassing and LUCA 1998 were checked in LUCA 1998 Field Verification, which occurred in the fall of 1999. The address list was created with the concept that for an address to be deleted from the list, two field operations must confirm the deletion. Thus, addresses that received a delete action in Block Canvassing but not in the LUCA 1998 operation had their status checked in LUCA 1998 Field Verification, even when there had been no LUCA 1998 participant for the area.

A Census Dress Rehearsal conducted in 1998 resulted in some addresses added to the MAF in those areas where the Dress Rehearsal took place. These were added before the creation of the August 1999 address list for questionnaire printing. The Dress Rehearsal areas used MO/MB and U/L questionnaire delivery methodologies.

An operation called New Construction allowed participating GUs to add new housing units to the census address list in MO/MB areas up until Census Day. The Bureau also incorporated new addresses from the November 1999 and February 2000 DSFs when block numbers could be determined and the blocks were in MO/MB areas. Questionnaires with printed address labels were prepared for these housing units, which were enumerated during later operations.

After Census Day, certain nonresponding housing units were enumerated or deleted from the address list in the Nonresponse Follow-up (NRFU) and Coverage Improvement Follow-up (CIFU) operations. These follow-up operations also added housing units. In addition, we added new addresses from the April 2000 DSF to the address list for enumeration in CIFU if they had block codes. The final address status check operation was a field verification of the addresses that were added to the MAF when respondents who believed they had not received a census form sent in a Be Counted form or called Telephone Questionnaire Assistance. This Address Field Verification also included a status check on addresses that had been deleted in operations after the creation of the initial address list for questionnaire printing if a census questionnaire had been returned.

Effect of Listing Operations in MO/MB Areas

The great majority of addresses on the MAF in the MO/MB areas resulted from the ACF. This file provided 82,499,258 addresses in MO/MB areas. Since this was the complete file of 1990 Census addresses, not all of the addresses provided by this file were in the appropriate enumeration areas.

From November 1997 to April 2000, the incorporated DSF files added 37,089,255 residential addresses to the MAF. Since the DSF is a complete file of USPS mailing addresses, most of the addresses on the DSF were already on the MAF. Additionally this count of addresses added to the MAF by the DSF includes addresses added simultaneously in other operations such as LUCA 1998 and Block Canvassing. A further qualification of the DSF addresses is that not every DSF address is in an appropriate enumeration area.

LUCA 1998 resulted in 3,646,584 adds to the MAF, while Block Canvassing resulted in 4,576,613 adds to the MAF. Some percentage of these were added by the operations simultaneously. In addition, some of the LUCA 1998 adds overlap with DSF adds. Also, many Block Canvassing operation adds matched to Block Canvassing deletes and are counted as moves.

Listing operations also resulted in corrections and deletes. One delete action on an address was not sufficient to keep the address from having a printed and delivered questionnaire. Although these addresses with deletes were sent to LUCA 1998 Field Verification, not all of these units were deleted in that operation or in the later follow-up operations NRFU and CIFU. In the end, 1,213,416 of the 5,206,579 units deleted in Block Canvassing were eventually enumerated.

The New Construction operation added 386,816 addresses to the MAF. Many of these were also added by the additional DSFs that were incorporated, which were the November 1999, the February 2000 and the April 2000 DSFs.

Special Place/Group Quarters operations were conducted for the enumeration of people at special housing situations such as nursing homes and college dormitories, which are not housing units. When housing units at Special Places were not included on the list of housing units for the operations, they were added in the operations. These operations added 76,225 housing units at Special Places.

U/L Areas

In areas with non-city-style addresses, questionnaires were hand delivered rather than mailed. Update/Leave is the name for this questionnaire delivery operation. The original address list for U/L areas was created in an operation called Address Listing. In Address Listing, all addresses were listed and simultaneously added to Census maps with a location designation known as a map spot. Housing unit counts by block were checked by participating GUs in an operation called LUCA 1999. Blocks contested by the GUs were then relisted, and the final results could be appealed by the GUs. The address list and the maps in these areas were updated again during the U/L operation, and possibly again during NRFU and CIFU operations. The New Construction operation and the addition of new DSF records were not necessary in these areas because of updating to the address list that occurs when questionnaires are being delivered.

Effect of Listing Operations in U/L Areas

Address Listing was responsible for the vast majority of the addresses in U/L areas. This initial listing operation resulted in 23,997,448 addresses added to the MAF. LUCA 1999 relisting put an additional 348,092 units on the MAF, and LUCA 1999 appeals added another 18,328 addresses, some of which were also added during U/L. The U/L operation resulted in 1,701,131 added addresses.

Operations conducted in both MO/MB and U/L Areas

For operations that occurred in both MO/MB and U/L areas, the results given here are not split out by questionnaire delivery methodologies. In those areas where the Dress Rehearsal occurred, there were 75,453 addresses added to the MAF. During Census 2000, the follow-up operation NRFU added 429,550 addresses to

the MAF, and the coverage operation CIFU added 108,632 addresses to the MAF.

Other Enumeration Areas

Specific methodologies were adopted for areas with anticipated questionnaire delivery or enumeration challenges. In particular, some areas planned for MO/MB were discovered to contain multi-unit apartment structures with only one mail drop. Questionnaires needed to be hand delivered in these areas. This questionnaire delivery methodology is called Urban U/L. Additional updates to the address list were possible at the time of questionnaire delivery. In areas originally planned for MO/MB or U/L where low response rates were anticipated, the enumeration occurred at the time of the questionnaire delivery. The questionnaire delivery methodology for these areas is called Update/Enumerate. The NRFU and CIFU operations were not required in areas that were enumerated at the time of the census.

In very remote regions of the country and parts of Alaska that are inaccessible during certain times of the year, the address list was not created before the census, but, rather, concurrently with the enumeration. These are List/Enumerate and Remote Alaska enumeration areas. The methodology is the same for these areas.

The Urban U/L operation added 8,617 addresses; Update/Enumerate added 120,785 addresses; List/Enumerate provided 392,558 new addresses, and Remote Alaska listed 27,009 new addresses.

ADDRESS LIST OPERATIONS TALLIES

The tables below give the tallies of the Census 2000 address listing operations and files. An Original Source variable, created for the evaluations of MAF-building operations, assigns to every address record the identification of the first operation or file to add the address to the MAF. The number of adds from an operation is greater than the number of addresses having that operation as an Original Source because an operation can add an address even when it is already on the address list, and an operation can add addresses outside its designated area. The Original Source variable more accurately reflects the effects of an operation on the MAF. However, because certain

operations were performed simultaneously, sometimes the original source of an address on the MAF is more than one operation.

Tallies presented in the tables are the number of housing units added by each source, the number of housing units deleted by each source, and the number of housing units added for which the given operation is an Original Source of the address record. The Original Source can be more than one operation or file, and there is no tally in these tables of which addresses were added solely by the operation or file shown.

The "Address Included in Final Census" columns show how many of the addresses in the initial columns were included in the final Census address list. For deletes, this represents the number deleted in that operation that were eventually enumerated in the Census.

One complicating factor to these tallies is the result of units that were merged. Records found to be duplicates of one another were linked, and the operational information on each record was added to that of the other record. As a result, a record will be associated with a particular operation when the linked record is associated with that operation, perhaps incorrectly. These linked records are part of the first set of tallies, including the "Operation is an Original Source" tally, when at least one of the records was added in the particular operation or file. However, duplicated records are not part of the final census tallies.

These counts include Puerto Rico, which underwent the Address Listing, U/L, NRFU, and CIFU operations, as well as Be Counted and Telephone Questionnaire Assistance. Units that are Special Places or Group Quarters are excluded from these counts.

Disclaimer

This paper reports the results of research and analysis undertaken by Census Bureau staff. It has undergone a Census Bureau review more limited in scope than that given to official Census Bureau publications. This report is released to inform interested parties of ongoing research and to encourage discussion of work in progress.

Table 1: Pre-Census Operations in MO/MB Areas*

| Source | Total Number of Addresses | | | Addresses Included in Final Census | | |
|-------------------------------------|---------------------------|-------------------|---------------------------------|------------------------------------|-------------------|---------------------------------|
| | Operation Adds | Operation Deletes | Operation is an Original Source | Operation Adds | Operation Deletes | Operation is an Original Source |
| ACF | 85,881,447 | N/A | 82,499,258 | 74,514,515 | N/A | 71,381,708 |
| Block Canvassing^a | 6,689,729 | 5,206,579 | 4,576,613 ^b | 4,989,440 | 1,213,416 | 3,218,563 |
| Dress Rehearsal | 271,905 | 9,178 | 75,453 | 194,269 | 659 | 16,539 |
| DSF^c | 119,500,698 | N/A | 37,089,255 | 98,847,552 | N/A | 16,958,068 |
| LUCA 1998^a | 6,537,283 | 506,871 | 3,646,584 ^d | 4,018,913 | 145,917 | 1,566,942 ^d |
| Field Verification | N/A | 2,721,511 | N/A | N/A | 446,810 | N/A |
| Appeals^a | 313,536 | 10,680 | N/A | 139,431 | 5,477 | N/A |

* These numbers are preliminary and could change in subsequent census processing.

- a. The adds for these operations do not exclude housing units that are also included in the universe.
- b. These counts include cases where the original source is exclusively Block Canvassing and cases where the original source is both Block Canvassing and LUCA 1998. This yields the number of cases added by the Block Canvassing operation but not the total of cases for which the operation was solely responsible for adding the unit to the MAF.
- c. The DSF counts include the November 1997 DSF, the September 1998 DSF, the November 1999 DSF, the February 2000 DSF, and the April 2000 DSF.
- d. These counts include cases where the original source is exclusively LUCA 1998, cases where the original source is a combination of block canvassing and LUCA 98, and cases where the original source is a combination of the September 1998 DSF and LUCA 98.

Table 2: Pre-Census Operations in non-MO/MB areas*

| Source | Total Number of Addresses | | | Addresses Included in Final Census | | |
|--|---------------------------|-------------------|---------------------------------|------------------------------------|-------------------|---------------------------------|
| | Operation Adds | Operation Deletes | Operation is an Original Source | Operation Adds | Operation Deletes | Operation is an Original Source |
| Address Listing | 24,041,611 | N/A | 23,997,448 | 21,982,413 | N/A | 21,947,454 |
| LUCA 1999 Relisting^a | 350,237 | 148,869 | 348,092 | 288,106 | 5,852 | 287,217 |
| Appeals^a | 18,442 | N/A | 18,328 ^b | 10,053 | N/A | 9,997 ^b |

* These numbers are preliminary and could change in subsequent census processing.

- a. The adds for these operations do not exclude housing units that are also included in the universe.
- b. These counts include cases where the original source is exclusively LUCA 1999 Appeals, and cases where the original source is a combination of LUCA 99 Appeals and Questionnaire Delivery.

Table 3: Questionnaire Delivery Operations*

| Source | Total Number of Addresses | | | Addresses Included in Final Census | | |
|--------------------------|---------------------------|-------------------|--|------------------------------------|-------------------|--|
| | Operation Adds | Operation Deletes | Operation is an Original Source ^a | Operation Adds | Operation Deletes | Operation is an Original Source ^a |
| Update/Leave | 1,755,961 | 1,351,802 | 1,701,131 | 1,494,776 | 700,736 | 1,443,113 |
| Urban U/L | 13,244 | 39,721 | 8,617 | 10,455 | 13,070 | 6,155 |
| Update/ Enumerate | 130,015 | 61,131 | 120,785 | 122,735 | 5,417 | 118,011 |
| List/Enumerate | 392,590 | N/A | 392,558 | 389,749 | N/A | 389,718 |
| Remote Alaska | 27,009 | N/A | 27,009 | 26,987 | N/A | 26,987 |

* These numbers are preliminary and could change in subsequent census processing.

- a. These totals include housing units for all enumeration areas, including where the type of enumeration area field is blank and where the type of enumeration area is MO/MB.

Table 4: Follow-Up Operations*

| Source | Total Number of Addresses | | | Addresses Included in Final Census | | |
|-------------|---------------------------|-------------------|---------------------------------|------------------------------------|-------------------|---------------------------------|
| | Operation Adds | Operation Deletes | Operation is an Original Source | Operation Adds | Operation Deletes | Operation is an Original Source |
| NRFU | 715,037 | 6,233,172 | 429,550 | 630,558 | 1,149,134 | 374,007 |
| CIFU | 207,315 | 2,648,322 | 108,632 | 175,077 | 375,619 | 88,878 |

* These numbers are preliminary and could change in subsequent census processing.

Table 5: Respondent-initiated Questionnaires*

| Source | Total Number of Addresses | | | Addresses Included in Final Census | | |
|---|---------------------------|-------------------|---------------------------|------------------------------------|-------------------|---------------------------|
| | Source Adds | Operation Deletes | Source is Original Source | Source Adds | Operation Deletes | Source is Original Source |
| Be Counted | 583,771 | N/A | 185,521 ^a | 420,401 | N/A | 58,822 ^a |
| Telephone Questionnaire Assistance | 722,588 | N/A | 143,715 ^b | 597,361 | N/A | 53,928 ^b |
| Address Field Verification | N/A | 441,702 | N/A | N/A | 2,504 | N/A |

* These numbers are preliminary and could change in subsequent census processing.

- a. This includes cases where the original source is exclusively Be Counted forms and cases where the original source is a combination of Be Counted forms and Telephone Questionnaire Assistance.
- b. This includes cases where the original source is exclusively Telephone Questionnaire Assistance and cases where the original source is a combination of Be Counted forms and Telephone Questionnaire Assistance.

Table 6: Other Operations*

| Source | Total Number of Addresses | | | Addresses Included in Final Census | | |
|--|---------------------------|-------------------|------------------------------|------------------------------------|-------------------|------------------------------|
| | Operation Adds | Operation Deletes | Operation is Original Source | Operation Adds | Operation Deletes | Operation is Original Source |
| New Construction | 654,263 | N/A | 386,816 ^a | 371,645 | N/A | 177,554 ^a |
| Special Place/ Group Quarters Master File | 145,257 | N/A | 76,225 | 47,064 | N/A | 22,964 |
| Special Place/ Group Quarters Enumeration | 81,579 | 25,573 | | 61,563 | 11,204 | |

* These numbers are preliminary and could change in subsequent census processing.

- a. These counts include cases where the original source is exclusively New Construction, cases where the original source is a combination of New Construction and the February 2000 DSF, cases where the original source is a combination of New Construction and the April 2000 DSF, cases where the original source is a combination of New Construction and Questionnaire Delivery, and cases where the original source is a combination of New Construction, the April 2000 DSF, and Questionnaire Delivery.