

## The 2000 Dress Rehearsal Master Address File Building Process

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### INTRODUCTION

The Census Bureau is developing a nationwide address list called the Master Address File (MAF) to document the address of every living quarters in the United States and will use it to implement the full range of Census Bureau demographic statistical programs, including Census 2000. The MAF building process for the Census 2000 Dress Rehearsal involved a series of operations that built on each other and ultimately resulted in the address list used to conduct the census. The MAF building process differed for areas with mail delivery to predominantly city-style addresses (mailout/mailback areas) and areas with predominantly non-city-style addresses (update/leave areas). City-style addresses are characterized by a house number and street name; non-city-style addresses by rural route or box numbers. This paper summarizes the entire dress rehearsal MAF building process. It should be noted that the data presented provides some insight into what we can expect in the Census 2000 environment, but cannot be generalized to the nation, or compared across dress rehearsal sites.

### BACKGROUND

The Census 2000 Dress Rehearsal was conducted in Columbia, South Carolina and the eleven surrounding counties; Menominee County, Wisconsin; and Sacramento, California. Each dress rehearsal site was selected because of its demographic and geographic characteristics, and to provide experience with some of the expected Census 2000 environments. Each site used a different mix of census and statistical procedures.

The *Sacramento, California* site was selected because it contains great diversity among racial and ethnic groups. The *Columbia, South Carolina* site was selected because it contains living situations and socioeconomic characteristics that are not found in a predominately urban environment; the *Menominee County, Wisconsin* site because it includes the Menominee American Indian Reservation.

The methodology used to evaluate each MAF building operation is specific to the process in which it was conducted. Basic counts and percentages are presented, and in some operations the number of addresses added, corrected, or deleted. Note that the relative impact of each operation could not be fully assessed due to the manner in which data were retained on the MAF extracts.

### MAF BUILDING OPERATIONS

The MAF building operations in the dress rehearsal were as follows for the mailout/mailback areas: 1990 Address Control File, May 97 Delivery Sequence File, Targeted Multi-Unit Check, Targeted Canvassing, Postal Validation Check, and Urban Update Enumerate. In the Update/Leave areas: Address Listing, and Update/Leave. In both mailout/mailback and Update/Leave areas the Local Update of Census Addresses and Be Counted/Telephone Questionnaire Assistance operations were conducted.

*1990 Address Control File (ACF) and May 1997 Delivery Sequence File (DSF):* The ACF and DSF were used to create the initial Master Address File for mailout/mailback areas of the dress rehearsal sites. The ACF is a file of addresses developed by Census, for the 1990 Census, and is based on several initial list operations and a series of coverage improvement operations. The DSF is a file of addresses provided by the United States Postal Service. The two files were matched against each other within ZIP Code and street name.

*Targeted Multi-Unit Check (TMUC):* TMUC was conducted in Sacramento and the mailout/mailback area of South Carolina. The operation compared the housing unit counts at multi-unit addresses (apartments, rooming houses, etc.) between the 1990 Address Control File (ACF) and the May 1997 Delivery Sequence File (DSF). Where these counts differed, enumerators visited or telephoned (when possible) these basic street addresses, to ensure that the census address list had the correct number of units. Enumerators also updated the unit designations for each unit.

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This paper reports the results of research and analysis undertaken by Census Bureau staff. It has undergone a more limited review than official Census Bureau Publications. This report is released to inform interested parties of research and to encourage discussion.

*Targeted Canvassing (TC):* Targeted Canvassing was conducted in Sacramento and Columbia City, South Carolina. In the operation, local officials were asked to identify and prioritize blocks where they expected hidden housing units to exist. These hidden units were units that post offices may not be aware of because they were in basic street addresses (BSAs) where mail was delivered to one specific place and later distributed to individual units by non-U.S. Postal employees (building managers, landlords, etc.). These BSAs may be recent conversions from single unit addresses (like a basement or garage apartment) or they may be BSAs with purposely hidden units because they are illegal. During canvassing, field staff looked for missing or hidden units in the particular blocks identified by the local officials or a subset of these blocks, depending on how many were identified.

*Postal Validation Check:* In the Postal Validation Check operation, United States Postal Service employees verified the completeness of the MAF by comparing MAF addresses with the addresses in their carrier delivery routes. The Census Bureau limited the operation to 29 ZIP Codes (seven in South Carolina and twenty-two in Sacramento) that were entirely within the dress rehearsal sites and entirely inside mailout/mailback areas. The operation's primary purpose was to capture late new construction in time for the mail out of census questionnaires.

U.S. Postal Service employees also provided updates to address information for existing units on the MAF. The Census Bureau did not make use of these corrections or the information the U.S. Postal Service provided concerning incorrect or undeliverable addresses, since these preexisting addresses were already in the process for printing and mailing census questionnaires. The U.S. Postal Service provided address adds and deletes at a charge of 17 cent per address.

*Address Listing:* Address Listing was conducted in Menominee and the Update/Leave areas of South Carolina, and is the initial source for building the MAF in these areas. In the operation, census enumerators went door-to-door to identify the mailing address and physical location of housing units. The enumerators also map-spotted each housing unit on a block map. Enumerators provided a concise description of structures where no address was visible.

*Update/ Leave:* The Update/Leave operation was conducted just prior to Census day in Menominee and the Update/Leave areas of South Carolina. Enumerators canvassed each block in their assigned area, matching

what was found on the ground to the list of addresses in the Update/Leave address register. They updated the register by adding new addresses, deleting addresses they could not locate, and correcting addresses, if necessary. When the enumerator found a new housing unit which was not on the register, they added the unit to the list, map spotted the unit on a block map, and addressed the appropriate form type of questionnaire. The enumerator was also responsible for updating the block map with new street features, corrections to street/road names, and deleting street features that did not exist.

*Local Update of Census Addresses (LUCA):* The LUCA operation was conducted in all dress rehearsal sites. During the Local Update of Census Addresses operation, local and tribal governments participated, voluntarily, in a partnership program with the Census Bureau to conduct a review of the addresses on the Master Address File. Local and tribal government officials were given the opportunity to review the census address list for accuracy and completeness before the Census Bureau delivered questionnaires.

The Census Bureau gave files of addresses (paper or electronic) and maps (used to identify census geography such as block numbers) to the participating local and tribal governments for their review. The Census Bureau allowed governments one month to review these files and maps, and to provide feedback to Census staff. Participating governments provided feedback in the form of recommended adds, deletes, or corrections of addresses. The Census Bureau then conducted a series of operations to determine whether to accept or reject the recommended actions.

Once the Census Bureau finished processing all of a local or tribal government's suggested changes to the MAF, the agency provided the government feedback identifying which changes were accepted and were rejected. At this stage, the government had the opportunity to review the Census Bureau's results and to provide additional feedback. This was an opportunity for the government to correct information from their previous submissions or to attempt to convince the Census Bureau of the existence of units the agency could not find during LUCA field verification.

After the local government had the opportunity to provide a second round of feedback, the field staff made the final determination about whether to include specific housing units in the census. This step of the process was known as LUCA Reconciliation. Due to timing constraints, for the most part, the Census Bureau simply accepted any feedback the local or tribal governments gave us at this stage and included all added units in the

census process.

It should also be noted that prior to the implementation of the LUCA program, the Census Bureau had experimented with a program called the Program for Address List Supplementation (PALS). In this program, local governments gave the Census Bureau their independent list of addresses. The addresses were compared against the address list maintained by the Census Bureau. Submission of inconsistent and/or nonstandard information, low participation rates, etcetera, led to the cancellation of the program. PALS was only conducted in the Sacramento site. The results are not presented in this paper.

*Be Counted and Telephone Questionnaire Assistance (BC/TQA):* The Be Counted and Telephone Questionnaire Assistance programs are conducted in both the mailout/mailback and Update/Leave areas of dress rehearsal sites. The operations provide two ways that people can complete a census form if they were not otherwise enumerated.

## FINDINGS

### *Targeted Multi-Unit Check (TMUC)*

Of the estimated housing units on the MAF for Sacramento (153,000\*), approximately 12.7 percent were canvassed, which are contained within 1,325 basic street addresses. Of the 1,325 BSAs canvassed in the operation, 31.2 percent were resolved by telephone, and 68.8 percent by field verification. The TMUC operation contributed 228 additional housing units to the building of the MAF, and deleted 689.

Of the estimated number of housing units in the South Carolina site\*\* (197,820\*\*\*), approximately 6.22 percent were canvassed, which are contained within 1,867 basic street addresses. Of the 1,867 BSAs canvassed in the operation, 15.5 percent were resolved by telephone, and 84.5 percent by field verification. The TMUC operation contributed 274 additional housing units to the building of the MAF, and deleted 1,159.

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\* *The actual number of housing units on the MAF in mailout/mailback areas of Sacramento, before this operation, was not possible to determine. Therefore, the number of estimated housing units in the site is used as the base for the percentage of housing units canvassed.*

\*\* *NO specific housing unit count for Columbia City was available, therefore the estimated housing units in the site were used as the base for the percent canvassed.*

\*\*\**The estimate is based on the estimated number of housing units in the site (252,000), and the percentage of units in the mailout/mailback areas of South Carolina after the final results of the dress rehearsal (78.5%).*

### *Targeted Canvassing (TC)*

Of the 153,000\* estimated housing units in Sacramento, approximately 12.7 percent were in blocks that were canvassed. Targeted Canvassing added 756 units to the MAF. These adds represent a 3.9 percent increase of housing units (HUs) in the blocks canvassed.

Of the estimated number of housing units in the mailout/mailback areas of the South Carolina site\*\* (197,820\*\*\*), approximately 2.9 percent were canvassed. Targeted Canvassing added 111 units to the MAF. These adds represent a 1.9 percent increase of housing units in the blocks canvassed.

### *Postal Validation Check*

The number of adds paid for by the Census Bureau does not match the number of adds processed in the operations. In Sacramento, 3,189 adds were processed in the operation, however, the Census Bureau only paid for 3,054. In South Carolina, 1,587 adds were paid for, but only 1,223 processed. This differences can be attributed to one or more of the following:

- inconsistent tallying and or/invoicing regarding multiple addresses on a single card,
- the USPS not charging Census for addresses returned very late, and
- the USPS returning addresses so illegible (or incomplete) that they were not keyed.

The Postal Validation Check operation also provided a substantial number of addresses recommended for deletes. Because of the timing of the operation and the inconsistency of how the USPS and the Census Bureau defined a housing unit, we are not able to make use of addresses marked for deletion.

**Table 1.**

PVC Cards Paid For				
	Sacramento		South Carolina	
<b>Adds</b>	3,054	(24.3%)	1,587	(32.7%)
<b>Deletes</b>	9,497	(75.7%)	3,269	(67.3%)
<b>Totals</b>	12,551	(100.0%)	4,856	(100.0%)

A high match rate was also found between new addresses provided by the Postal Service and addresses we already had on the Master Address File.

**Table 2.**

PVC Match Rate		
	Sacramento	South Carolina
<b>Matched to Units on MAF</b>	1,315 (41.2%)	658 (53.8%)
<b>Did Not Match to Units on MAF</b>	1,874 (58.8%)	565 (46.2%)
<b>Total</b>	3,189	1,223

Lastly, the Geography Division attempted to geocode all of the adds provided by the Postal Service, regardless of whether they matched to units already on the MAF. To the extent possible, computer programs were used to geocode the address. When that was unsuccessful, clerical geocoding was conducted.

**Table 3.**

Geocoding Results of Adds Not on MAF		
	Sacramento	South Carolina
<b>Computer Geocoded</b>	1,587 (85.0%)	270 (47.8%)
<b>Sent to Clerical Geocoding</b>	281 (15.0%)	295 (52.2%)
<b>Total</b>	1,868†	565

† Six of the 1,874 addresses not matching are not accounted for in the total.

**Address Listing**

The number of mailing addresses and physical descriptions obtained in the operation are presented below.

**Table 4.**

Units Listed Counts		
	South Carolina	Menominee
<b>Mailing Address</b>	50,595 (75.9%)	1,063 (51.6%)
<b>Physical Description</b>	16,109 (24.1%)	997 (48.4%)
<b>Total</b>	66,704	2,060

**Update Leave**

The number of added, corrected, and deleted addresses in the operation are presented in Table 5.

**Table 5.**

Update/Leave Counts		
	South Carolina	Menominee
<b>Added</b>	4,331	96
<b>Corrected</b>	7,543	566
<b>Deleted</b>	4,225	87

**Local Update of Census Addresses (LUCA)**

In terms of participation rates, the Census Bureau obtained the participation of the City of Sacramento and the Menominee Tribal government in the Local Update of Census Addresses program. In the South Carolina site, 31 of the 60 eligible governments (51.6 percent) participated. These government entities accounted for 98 percent of the 1990 Census housing units in the South Carolina site.

The Local Update of Census Addresses operation varied in the capturing of new addresses, corrections to addresses, and addresses to delete across the sites. The number of initial adds, corrections, and deletes accepted and rejected for the dress rehearsal sites are:

**Table 6.**

Initial LUCA feedback from Sacramento			
	Adds	Deletes	Corrections
<b>Accepted</b>	155 (5.3%)	0 (0.0%)	3,916 (86.5%)
<b>Rejected</b>	2,763 (94.7%)	0 (0.0%)	612 (13.5%)
<b>Total</b>	2,918	0	4,528

**Table 7.**

Initial LUCA feedback from South Carolina			
	Adds	Deletes	Corrections
Accepted	3,892 (12.6%)	5,361 (43.2%)	15,187 (56.3%)
Rejected	27,050 (87.4%)	7,053 (56.8%)	11,796 (43.7%)
Total	30,942	12,414	26,983

**Table 8.**

LUCA feedback from Menominee			
	Adds	Deletes	Corrections
Accepted	25 (100%)	17 (60.7%)	282 (97.6%)
Rejected	0 (0.0%)	11 (39.3%)	7 (2.4%)
Total	25	28	289

It should be noted that there was a large rejection rate of initial submissions across the sites. The Census Bureau rejected some adds because they matched to units already on the MAF or they could not be located in a field verification process. The Census Bureau also rejected some adds because we could not process them due to missing or unreadable information (e.g., no block number). The Census Bureau rejected some deletes and corrections because the local governments did not give the agency the MAF identification number which was needed to identify the referenced unit. The Census Bureau rejected other deletes because they referenced units that were outside of the jurisdiction of their governmental entity.

The total number of added units to the MAF includes adds initially accepted from participating governments, adds re-added during LUCA reconciliation, and adds added for the first time during the LUCA reconciliation step. Menominee did not provide additional feedback in the LUCA reconciliation step so the changes that the Census Bureau originally accepted are the full extent of the changes the agency made to the MAF based on Menominee's input (See Table 8).

**Table 9.**

Reconciled Changes to the MAF		
	Sacramento	South Carolina
Added	988	11,621
Deleted	0	5,361
Corrected	3,916	15,187

***Be Counted and Telephone Questionnaire Assistance (BC/TQA)***

In Sacramento, 1,575 Be Counted questionnaires were received. In South Carolina and Menominee, 783 and 21 Be Counted questionnaires were received, respectively. The total number of addresses added from the questionnaires received are presented in Table 10.

**Table 10.**

Be Counted/Telephone Questionnaire Assistance Results		
	Questionnaires Received	Addresses Added to the MAF
Sac	1,575	535 (34.0%)
SC	783	521 (66.5%)
Men	21	5 (23.8%)

**CONCLUSIONS/RECOMMENDATIONS**

As a tool for coverage improvement it was found that Targeted Canvassing was productive in providing adds to the blocks canvassed in Sacramento and South Carolina. However, TMUC found fewer than 300 new housing in both of the sites. It is also unclear from the Dress Rehearsal data whether improving coverage of housing units at multi-unit addresses can be done adequately over the phone. It should be noted that the Targeted Canvassing and TMUC will not be conducted in Census 2000 because we will be doing a 100 percent block canvassing in Mailout/Mailback areas of the country.

The Census Bureau obtained the participation of the City of Sacramento, the Menominee Tribal government, and 51.6 percent of the eligible South Carolina governments in the LUCA program. Although only 51.6 percent of the eligible South Carolina governments participated, they accounted for 98 percent of the 1990 Census housing units in the site. It is recommended that the Bureau continue its efforts to form partnerships with local

governments in this coverage improvement operation.

Part of the standard procedure of the U.S. Postal Service (USPS) in the Postal Validation Check operation is to provide address corrections and deletions, in addition to address adds. Because of the timing of the operation and the inconsistency of how the USPS and the Census Bureau define a housing unit, we are only able to make use of new addresses provided in the operation. Also, addresses recommended to be deleted could not be used because existing addresses were already printed on census questionnaires and ready for delivery. However, we pay the postal service for these deletions. In Sacramento, 75.7 percent of the 12,551 addresses we paid for were deletions. In South Carolina, 67.3 percent of the 4,856 addresses we paid for were deletions.

In both Sacramento and South Carolina, there was a high match rate between new addresses provided by the postal service and addresses we already had on the MAF (41.2 percent of the 3,189 in Sacramento and 53.8 percent of the 1,223 in South Carolina). We recommend that, as in the dress rehearsal, systems be put into place to look out for duplicate addresses provided in the Postal Validation Check operation.

In the LUCA operation a substantial number of initial submissions were rejected. The Census Bureau rejected some adds because they matched to units already on the MAF or they could not be located in the field verification operation. They also rejected some adds because the agency could not process them due to missing or unreadable information. Additionally, they rejected some corrections and deletes because local governments did not give the agency the MAF identification number which was needed to identify the referenced unit. As a result, we recommended that the Census Bureau do more to improve the process, and to educate and train LUCA participants to make this coverage improvement operation more efficient. It should be noted that revisions to the LUCA program have been made to improve both the process and training for Census 2000.

In Sacramento, 1,575 questionnaires were received in the Be Counted/TQA operations, contributing 535 new addresses to the MAF. In South Carolina, 783 questionnaires were received contributing 521 new addresses, and in Menominee 21 questionnaires were received contributing 5 new addresses. We recommend that more planning go into the operations of the Be Counted Program including the placement of Be Counted forms in the field and the geocoding of addresses in order to ensure that Be Counted response records have time to

make it into the Census process.

The relative impact of each operation on the building of the Master Address File could not be fully assessed in the evaluation. This was largely due to the manner in which data were retained on the Master Address File extracts used in the dress rehearsal. In particular, we could not obtain the universe of addresses going into each operation. The universe of addresses going into each operation would have provided a base against which to measure the relative impact of the operation. Additionally, the Master Address File extracts only retained the results of the most recent field operation. By updating the file with the most recent field operation, it was not possible to determine which operation was the initial input source. With these limitations, we still attempted to gain some sense of each operation's relative impact by examining the summarized information found in a series of MAF extracts.

For Census 2000, we recommended a thorough review of the flags set on the Master Address File that show the relative impact of each operation. In particular, the creation of specific variable fields that follow the history of an address, as they relate to an operation. Fields should also be created to determine if an address was part, or not part, of the initial universe for specific operations. The Decennial Statistical Studies Division is currently working with Geography Division and the Decennial Systems and Contracts Management Office to make these improvements.

#### **Reference**

Vitrano, Frank, Howard, Lionel, "Census 2000 Dress Rehearsal Evaluation - An Evaluation of the Master Address File Building Process" July 1999.