March 31, 2006

DAVID E. WILLIAMS, JR.
MANAGER, PROCESSING AND DISTRIBUTION OPERATIONS

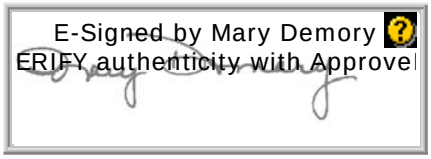
SUBJECT: Audit Report - Proposed Enhancement of the Singulation Scan Induction Unit at Bulk Mail Centers (Report Number NO-AR-06-004)

This report presents the results of our audit of the proposed enhancement to the Singulation Scan Induction Unit (SSIU) at bulk mail centers (BMCs) (Project Number 05YG040NO000). The objective of this audit was to evaluate the impact of the optical character reader (OCR) system on SSIU efficiency. We conducted this audit at the request of the U.S. Postal Service Headquarters manager, Processing and Distribution Operations, and in cooperation with local BMC officials.

We found that installing the OCR on the SSIUs would allow the Postal Service to process parcels more efficiently. Parcels are generally processed through two operations and barcode printer applicators used in processing are unreliable and antiquated. Consequently, the BMCs used more workhours than necessary to process parcels. Purchasing OCRs would improve efficiency by eliminating an operation, reducing manual mail handling, and decreasing the Postal Service's reliance on barcode technology.

During the audit, Postal Service managers were briefed on our finding before they presented the OCR Decision Analysis Report to the Capital Investment Committee (CIC). The CIC approved the Postal Service's proposal to purchase and deploy the OCR to 19 BMCs. Consequently, this report contains no recommendations. Management was given the opportunity to comment on the report and agreed with our finding. Management's comments, in their entirety, are included in Appendix D of this report.

We appreciate the cooperation and courtesies provided by your staff during the audit. If you have any questions or need additional information, please contact Robert J. Batta, director, Network Operations – Processing, or me at (703) 248-2300.



for
Colleen McAntee
Deputy Assistant Inspector General
for Core Operations

Attachments

cc: Paul E. Vogel
Walter F. O'Tormey
Jaime O. Fuentes
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EXECUTIVE SUMMARY

Introduction

The U.S. Postal Service Office of Inspector General (OIG) assessed the impact of the optical character reader (OCR) system on the efficiency of the Singulation Scan Induction Unit (SSIU). We conducted the audit at the request of the Postal Service Headquarters manager, Processing and Distribution Operations, and in cooperation with local bulk mail center (BMC) officials.

Results in Brief

While the SSIU has improved processing of parcels, use of the OCR can result in further improvements. Specifically, we found that the following conditions support the need for the OCR.

- A large percentage of mail had to be processed through two operations.
- Barcode printer applicators were unreliable and antiquated.

39 U.S.C. Part 1, Chapter 4, Section 403 (b) (1), states:

> It shall be the responsibility of the Postal Service to maintain an efficient system of collection, sorting, and delivery of the mail nationwide . . . . .

In addition, the *United States Postal Service Strategic Transformation Plan 2006 — 2010*, states in part:

> Bulk Mail Center secondary parcel sort systems will also be upgraded to improve read rates and productivity.

U.S. Postal Service management did not pursue deployment of the OCR at the BMCs until the completion of internal technical testing. Consequently, SSIUs were not operating at the highest level of efficiency, so BMCs had to use more workhours than necessary to process parcels.

	During the audit, Postal Service managers were briefed on our finding before they presented the OCR Decision Analysis Report to the Capital Investment Committee (CIC). The CIC approved the Postal Service's proposal to purchase and deploy the OCR to 19 BMCs.
Summary of Recommendations	This report contains no recommendations. However, management was given the opportunity to comment on the finding.
Summary of Management's Comments	Management concurred with our finding. They anticipate adding OCR capabilities to the SSIU will have a very positive effect on improved sorting efficiencies and productivities. Management's comments, in their entirety, are included in Appendix D.
Overall Evaluation of Management's Comments	Management's comments are responsive to the finding. Management's actions taken address the issues identified in the report.

INTRODUCTION

Background

Each of the 21 bulk mail centers (BMC)[1] distributes Parcel Post, Media Mail, Standard Mail, and Periodicals in bulk form. When bulk mail arrives at the BMCs, it is transported to primary or secondary parcel sorter machines.[2] Parcels sent to primary sorters are scanned or keyed in for address information. Parcels without barcodes can have a barcode applied with barcode printer applicators on the primary sorters, which increases the number of parcels the Singulation Scan Induction Unit (SSIU) can read. Pre-barcoded packages are often sent directly to the secondary sorters. Since the secondary sorters receive the majority of their mail pre-barcoded, the U.S. Postal Service installed the SSIU on the secondary sorters.

The SSIU automates the induction of the barcoded parcels onto the secondary parcel sorting machines by converting parcels into a single, optimally spaced line of separated parcels, recording the dimensions and weight, and reading the package barcode. The SSIU then inducts parcels onto sorting machines, which use the barcode information from the SSIU barcode scan to sort them. However, many parcels coming from other BMCs arrive with no barcodes because labels fall off or barcode printer applicators malfunction. When this mail is inducted into the secondary sorters, the SSIU cannot read it.

In January 2000, the Board of Governors authorized the Postal Service to spend over $103 million in capital and expense funds to buy and install SSIUs to process secondary parcels in the BMCs. In October 2001, the Postal Service issued a modification to the Decision Analysis Report (DAR) requesting an additional $12.5 million to complete the installation of 42 SSIUs in the 21 BMCs. Additional funding was needed to modify the generic design to site-specific designs at each BMC and to replace the laser-based barcode reader with a new, technologically superior camera-based reader. The camera-based reader outperformed the savings projections

[1] BMCs are located in Atlanta, Chicago, Cincinnati, Dallas, Denver, Des Moines, Detroit, Greensboro, Jacksonville, Kansas City, Los Angeles, Memphis, Minneapolis, New Jersey, Philadelphia, Pittsburgh, San Francisco, Seattle, Springfield, St. Louis, and Washington, DC. Since the BMCs in Chicago and New Jersey do not have the SSIU, they were not included in our review.

[2] In general, primary sorters process originating mail leaving the local service area to be transported to other BMCs. Secondary sorters generally process destinating mail to the local service area.

in the original DAR and allowed for future optical character reader (OCR) capabilities. Two sites, Chicago and New Jersey, did not have space to accommodate the SSIU, so only 38 SSIUs were installed at the remaining 19 BMCs.

In February 2004, an OCR[3] system was installed on the SSIUs at the Jacksonville BMC. The Jacksonville BMC is the only test site. The OCR gives the SSIU the ability to read those parcels that it previously could not read by providing character recognition capability, which interprets the address information on non-barcoded parcels. This will improve the percentage of mail that can be processed by the SSIU. Appendix A shows two pictures of the OCR unit.

In July 2005, the U.S. Postal Service Office of Inspector General (OIG) and the Postal Service agreed that a review of the need for the OCR system, and its impact on the SSIU, would add value to the Postal Service's efforts to process parcels more efficiently within the BMC network.

Objective, Scope, and Methodology

The objective of this audit was to evaluate the impact of the OCR system on SSIU efficiency. We reviewed parcel processing performance for all BMCs, using data from the Breakthrough Productivity Initiative web pages as well as data obtained from each BMC and the Web-based End-of-Run (WebEOR) system. We reviewed before-and-after data from the OCR test site, Jacksonville BMC, to determine whether the OCR at this BMC had improved the productivity of parcel processing. We did not test the validity of controls over these systems. However, we checked the accuracy of data by confirming our analysis and results with Postal Service managers.

We conducted this audit from September 2005 through March 2006 in accordance with generally accepted government auditing standards and included such tests of internal controls as we considered necessary under the circumstances. We discussed our observations and conclusions with management officials and included their comments where appropriate.

[3] The Postal Service has been using OCR technology since the mid-1950s for letter processing.

Prior Audit Coverage

We issued a prior report on this topic in 2001, *Singulate, Scan, Induction Unit* (Report Number DA-AR-01-006, September 27, 2001). We found the SSIU was experiencing delays at 18 of 21 BMCs, and we also found noncompliance with Occupational Safety and Health Administration (OSHA) noise level requirements. We recommended that the Postal Service revise the deployment schedule and ensure compliance with OSHA requirements. The Postal Service generally agreed with our recommendations and findings. In June 2003, the Postal Service provided documentation to demonstrate that the recommendations had been implemented.

AUDIT RESULTS

Assessment of Optical Character Reader Installation on Singulation Scan Induction Unit Efficiency

We found that installing the OCR system on the SSIU would process parcels more efficiently by increasing the number of parcels that can be read and processed on the secondary sorters. Specifically, the following conditions supported the need for the OCRs:

- A large percent of mail had to be processed through two operations.
- Barcode printer applicators were unreliable and antiquated.

39 U.S.C. Part 1, Chapter 4, Section 403 (b) (1), states:

> It shall be the responsibility of the Postal Service to maintain an efficient system of collection, sorting, and delivery of the mail nationwide. . . . .

In addition, the *United States Postal Service Strategic Transformation Plan 2006 — 2010*, states in part:

> Bulk Mail Center secondary parcel sort systems will also be upgraded to improve read rates and productivity.

Postal Service management did not plan to deploy the OCR at the BMCs until the completion of internal technical testing. Consequently, SSIUs were not operating at the highest level of efficiency, so the BMCs had to use more workhours than necessary to process parcels.

We briefed managers on the results of our audit before they submitted the OCR DAR to the CIC. The CIC subsequently approved the DAR.

Primary and Secondary Operations

We found that multiprocessing operations was inefficient — a large portion of incoming mail needed to be processed by both the primary and secondary operations. We analyzed the mail composition of the 19 BMCs with the SSIU for fiscal year (FY) 2005 and found that approximately 39 percent of incoming mail was not barcoded. Appendix B shows the percentage of incoming barcoded and non-barcoded mail

for each of the BMCs. This high percentage of non-barcoded mail prevents direct induction into the SSIU. Instead, this mail must receive additional processing at the primary operation where a barcode is applied. (See Illustration 1.)

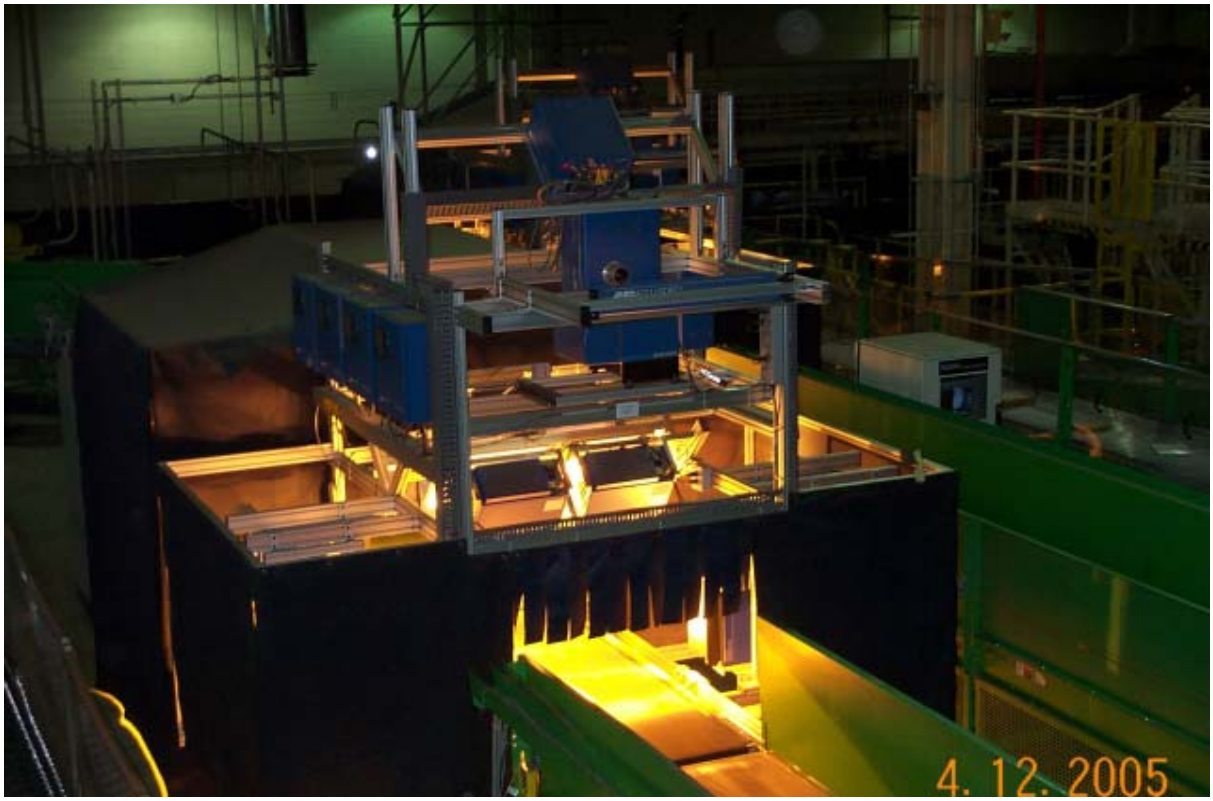


Illustration 1. The SSIU without the OCR can process only parcels with readable barcodes. In FY 2005, approximately 39 percent of incoming mail did not have barcodes and therefore required processing through the primary operation. (Washington BMC, April 12, 2005)

Once barcoded, parcels are then directed to the secondary sorter for further processing.[4] However, with the use of the OCR, a large percentage of mail could be directly inducted to the SSIU on the secondary operation.[5] (See Illustration 2.)

[4] Some mail is finalized on the primary sorters and not sent to the secondary sorters.
[5] Some BMCs will need to install additional equipment to increase the ability to induct directly into the secondary sorters.

Illustration 2. View of primary sorting operation at the Washington BMC with backlog of parcels not being worked. Introduction of the OCR would allow some primary mail to be processed on the secondary sorters, thus relieving congestion and reducing dependence on the primary operation. (Washington BMC, April 16, 2005)

Barcode Printer Applicators	Barcode printer applicators are used to place barcodes on parcels, which is necessary for further processing by the SSIU. We found these barcode printer applicators were unreliable and antiquated. Barcode Printer Applicators Unreliable. Barcode printer applicators were not always functioning properly and affected the ability of the SSIU to process parcels.[6] For example, at the Washington BMC, we found that eight of 10 barcode printer applicators were not working.[7] Barcode printer applicators also malfunctioned at other sites. Based on our survey of the 19 BMCs with SSIUs, 90 percent of the sites reported frequent malfunctions with the barcode printer applicators. In addition, in FY 2005, 16 BMCs submitted 568 repair orders for malfunctions of the barcode printer applicators. These repairs cost over $47,000 and required

[6] A barcode, which is affixed by barcode printer applicators, is necessary for the SSIU to sort parcels.
[7] The OIG conducted an audit at the Washington BMC in April 2005.

almost 1,100 workhours.[8] Examples of problems identified included: multiple labels printed, labels that did not adhere to parcels, illegible barcodes, jams, and misfeeds. The Postal Service has also had difficultly obtaining replacement parts. (See Illustration 3.)

Antiquated Barcode Printer Applicators. Many barcode printer applicators are over 13 years old[9] and had likely exceeded their useful service life.[10] The advanced age of this equipment will likely lead to increased malfunctions, maintenance costs, and difficulty with obtaining replacement parts. Also, barcode printer applicators are probably not the most efficient means of applying barcodes because of technological advances over the past 13 years. Furthermore, if the reliance on barcodes is continued, new barcode printer applicators may need to be purchased in the future.

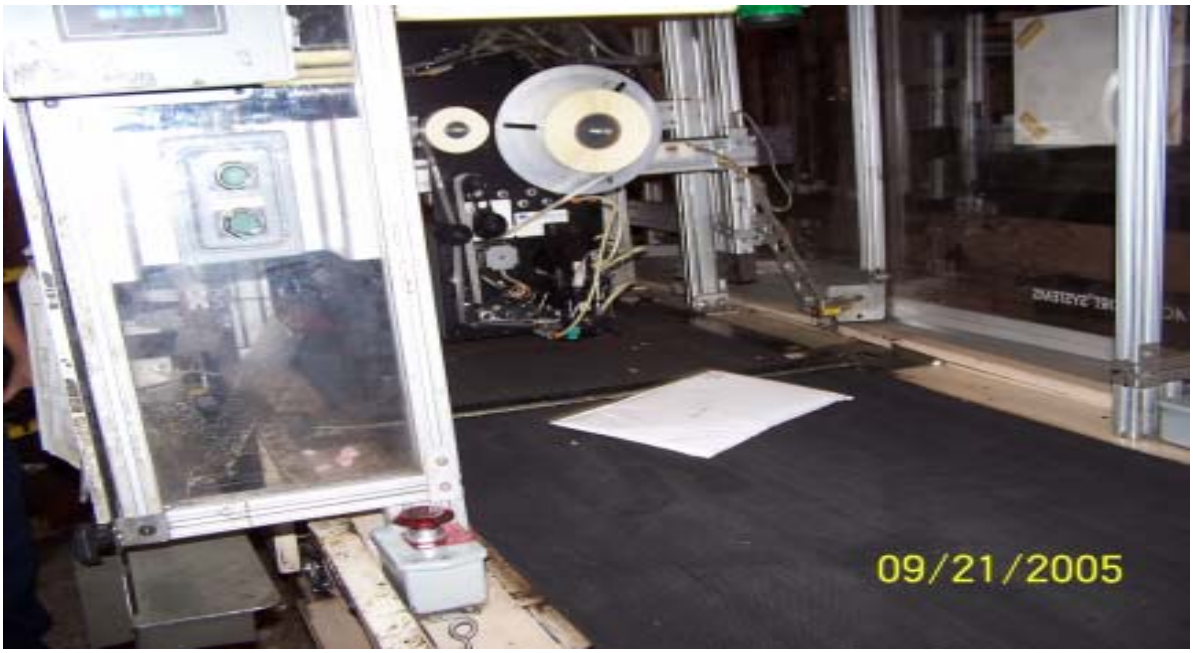


Illustration 3. Barcode printer applicator that had a missing label roll cover. Barcode labels were misapplied or were applied skewed, and sometimes missed the package entirely. (Jacksonville BMC, September 21, 2005)

[8] Three BMCs, Jacksonville, St. Louis, and Memphis, did not submit repair orders through the Technology Management database at Postal Service Engineering Headquarters.
[9] The only major enhancement to the barcode printer applicators during the past 5 years has been replacing the printer heads that were using ribbon technology with printer heads using thermal technology.
[10] The DAR for the barcode printer applicators did not indicate the length of useful service life. The Postal Service expected a 2-year life for the barcode printer applicators. However, under the Internal Revenue Service's rules for depreciation, the expected life for computer equipment and printers is 5 years.

Impact on Singulation Scan Induction Unit Operations Nationwide	Postal Service management did not pursue deployment of the OCR at the BMCs until the completion of internal technical testing. Based on our review, we found that the Postal Service should pursue OCR deployment. The use of the OCR could produce the following nationwide results: • Reduce reliance on the barcode printer applicators. • Reduce the need for multiprocessing operations. • Reduce mail handling, resulting in improved productivity. Reduce Reliance on the Barcode Printer Applicators. Barcode printer applicator problems have indirectly diminished SSIU efficiency, since a readable barcode must be on the parcel for it to be processed. However, the OCR would allow the SSIU to process parcels with or without a barcode, thus increasing SSIU efficiency. In addition, the Postal Service's need to maintain and/or acquire replacements for barcode printer applicators would be significantly reduced. Reduce the Need for Multi-Processing Operations. Through the use of the OCR, the Jacksonville BMC was able to significantly reduce its primary operation, since a larger percentage of incoming mail could be processed by the SSIU. For example, during the first year of implementation, the Jacksonville BMC reduced its primary operation workhours by 19.5 percent without a significant increase in secondary workhours.[11] If other BMCs[12] could obtain similar reductions, primary workhours could be reduced by about 343,000 annually. With the use of the OCR in conjunction with the SSIU, readability rates remained constant. For example, in September 2005, SSIU readability for the Jacksonville BMC was 84 percent, compared to the average SSIU readability of 83 percent for sites first using the primary operation. This meant that the Jacksonville BMC obtained the same or better readability as other BMCs and, at the same time,

[11] Secondary hours at Jacksonville BMC increased 5 percent.
[12] Chicago, New Jersey, Kansas City, Jacksonville, and St. Louis are excluded from this analysis since these sites either have no SSIU or have already begun to reduce their primary operation and induct mail directly into the SSIU.

reduced the need for sorting parcels on the primary operation.

Reduced Mail Handling Resulting in Improved Productivity. The ability to reduce sorting as a result of improved readability provided by the OCR reduced mail handling and improved productivity. For example, from June 2004 to September 2005, the Jacksonville BMC had a handling ratio[13] of 1.21, compared to the average handling ratio of 1.56. This means that Jacksonville BMC rehandled mail, on average, 22 percent fewer times than other BMCs. Appendix C shows the handling ratio for each of the BMCs.

Additionally, less handling resulted in improved productivity based on first handling pieces (FHP) per workhour. For example, before the OCR was installed at the Jacksonville BMC, FHP productivity averaged 259 pieces per workhour in the first quarter of FY 2003. After the OCR was installed, productivity increased to 283 pieces per workhour, a 9 percent increase. Furthermore, the Jacksonville BMC reduced total machineable parcel processing workhours from 260,493 in FY 2003 to 247,333 in FY 2005, a decrease of 13,160 workhours (5 percent). This workhour reduction occurred although machineable parcels increased by 2.75 million pieces (3.75 percent) in total volume during the same time period.

Management's Actions	During the audit, Postal Service managers were briefed on our finding before they presented the OCR DAR to the CIC. The CIC approved the Postal Service's proposal to purchase and deploy the OCR to 19 BMCs. Consequently, we are not making any recommendations.
Management's Comments	Management concurred with our finding. Management anticipates adding OCR capabilities to the SSIU will have a very positive effect on improved sorting efficiencies and productivities.
Evaluation of Management's Comments	Management's comments are responsive to the finding. Management's actions taken address the issues identified in the report.

[13] Handling ratio is calculated as total pieces handled divided by FHP.

APPENDIX A

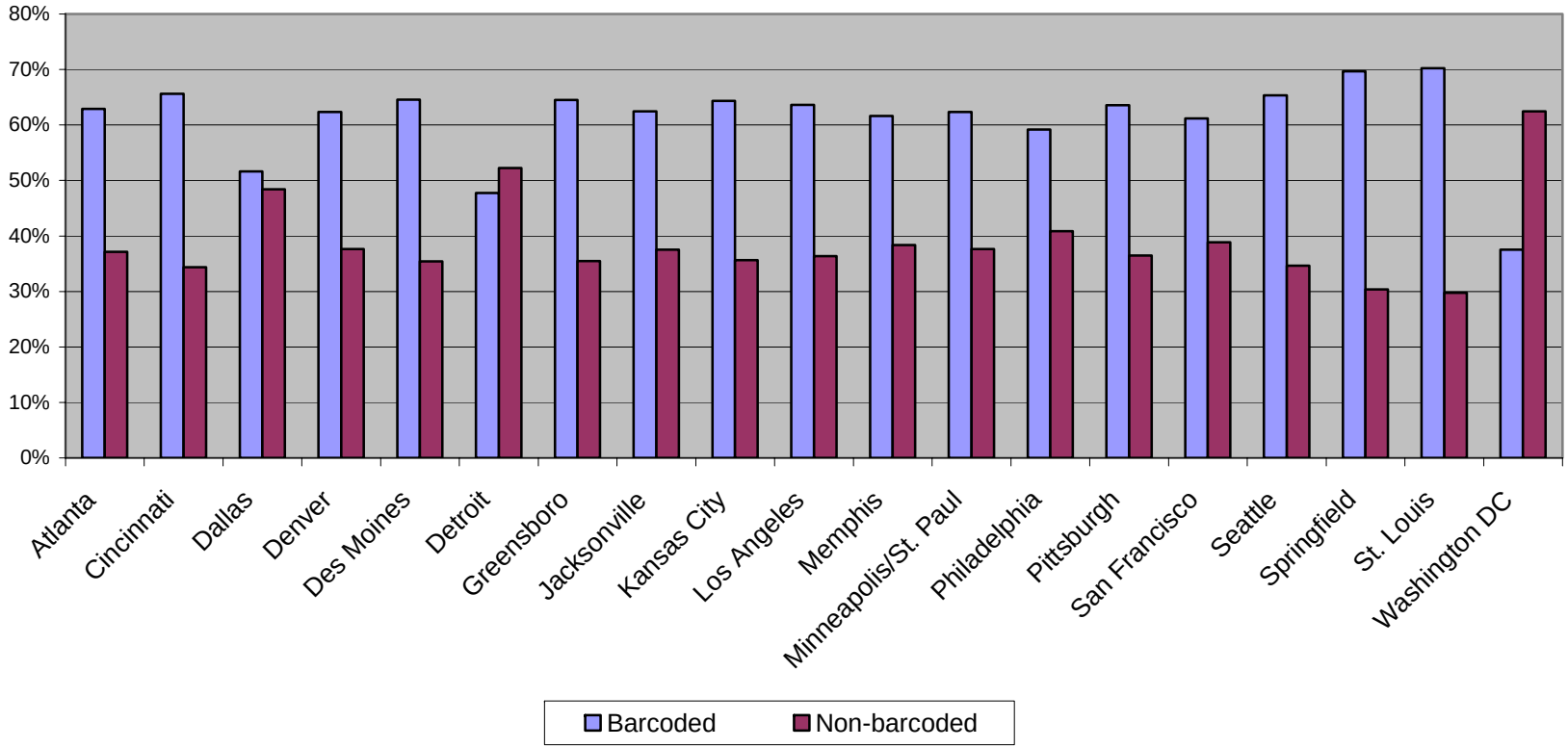
OPTICAL CHARACTER READER EQUIPMENT

The OCR system consists of cabinets with personal computers, communication equipment, and software for OCR image processing. The OCR reads addresses, which allows the processing of non-barcoded parcels. (Jacksonville BMC, March 23, 2005)

OCR image server video display and cabinets with image server units. The Postal Service reported that the OCR successfully processed between 60 and 65 percent of the non-barcoded parcels. (Jacksonville BMC, March 23, 2005)

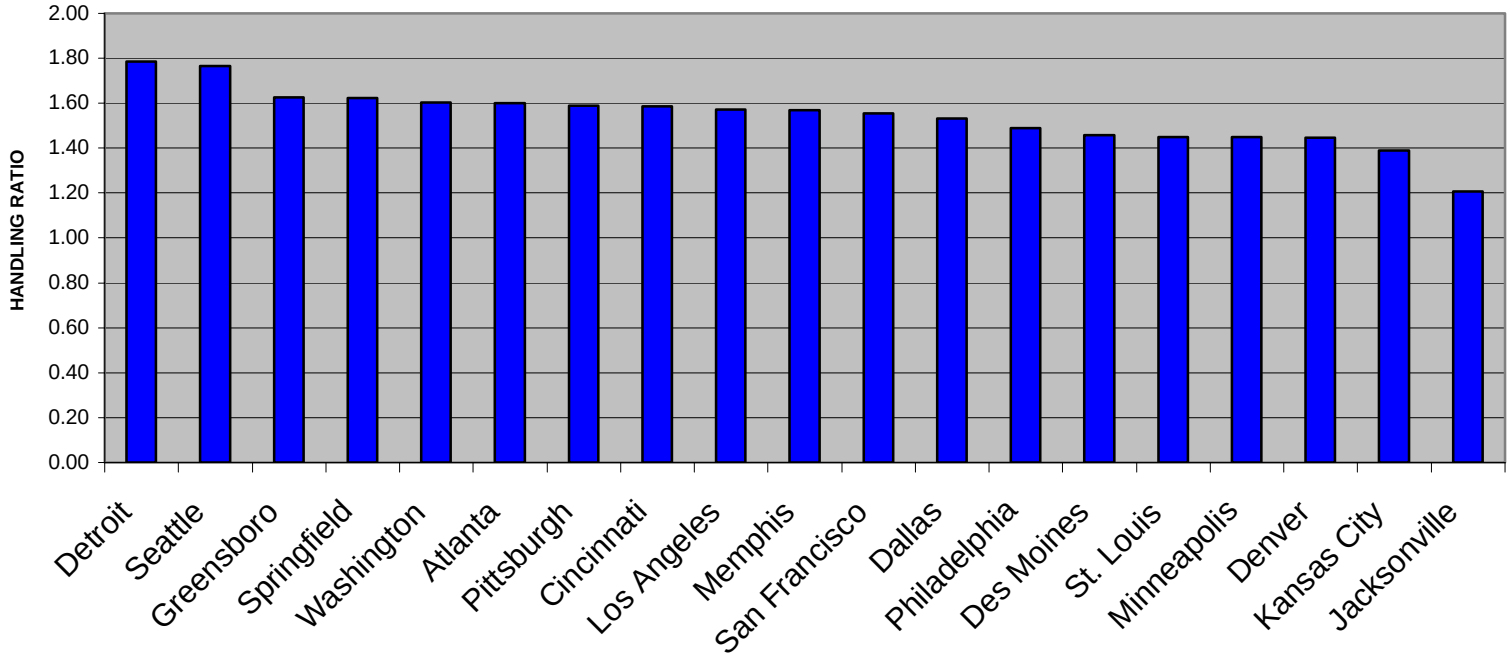
APPENDIX B

FISCAL YEAR 2005 PERCENTAGE OF BARCODED VERSUS NON-BARCODED MAIL AT 19 BULK MAIL CENTERS



APPENDIX C

HANDLING RATIO COMPARISON FOR 19 BULK MAIL CENTERS WITH SINGULATION SCAN INDUCTION UNITS JUNE 2004 THROUGH SEPTEMBER 2005



APPENDIX D. MANAGEMENT'S COMMENTS

PROCESSING OPERATIONS

UNITED STATES POSTAL SERVICE

March 23, 2006

KIM H. STROUD

SUBJECT: Proposed Enhancement of the Singulation Scan Induction Unit at Bulk Mail Centers (Report Number NO-AR-06-DRAFT)

I agree and concur with the findings, as outlined in the above referenced report. Adding Optical Character Recognition (OCR) capabilities to the current Bulk Mail Center (BMC) secondary Singulation Scan Induction Unit (SSIU's) will have a very positive affect on improved sorting efficiencies and productives.

This is a project that Processing Operations has embraced and supported since the concept and testing phases.

David E. Williams

cc: Mr. Vogel
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Mr. Fuentes

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