OFFICE OF INSPECTOR GENERAL
UNITED STATES POSTAL SERVICE

December 24, 2008

WALTER F. O'TORMEY
VICE PRESIDENT, ENGINEERING

ANTHONY M. PAJUNAS
VICE PRESIDENT, NETWORK OPERATIONS

SUBJECT: Audit Report – Radio Frequency Identification Technology: Asset
Management (Report Number DA-AR-09-002)

This report presents the results of our self-initiated audit to assess the feasibility of radio
frequency identification (RFID) technology for asset management (Project Number
08YG017DA000). Our objective was to determine the opportunities available to adopt
RFID technologies in order to manage assets and lower operational costs. See
Appendix A for additional information about this audit.

RFID Technology Feasible to Manage Assets

The Postal Service has opportunities to adopt RFID technology to improve the
management of mail transport equipment (MTE) inventories and minimize longstanding
pallet losses. At present, the Postal Service does not have an effective inventory
tracking system to curtail pallet loss. The Postal Service lost an estimated 6.37 million
pallets valued at $127.4 million during the 4-year period from fiscal years (FY) 2004
through 2007.

The estimated cost of using RFID technology to control pallet loss is $40 million for the
initial infrastructure investment and at least $3.5 million in operating costs for each
additional year. Consequently, the Postal Service could save an average of $18 million
annually[1] and a total of $127 million over a 10-year investment period by implementing
the RFID technology to prevent pallet loss.

RFID has other applications to assist in managing assets. For example, the Postal
Service lost 15 million trays valued at approximately $47 million from FYs 2004 through
2007. Because of the volume involved, controlling tray losses would be a larger
undertaking than that for pallets, and the added annual operating costs for tracking trays
would need to be considered. However, using the RFID infrastructure to control both
pallet and tray losses appears feasible. See Appendix B for our detailed analysis.

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[1] Estimated annual savings from reducing pallet losses minus operating and tagging costs. See
Appendix C.

We recommend the Vice President, Engineering, in cooperation with the Vice President, Operations:

1. Explore opportunities to employ radio frequency identification (RFID) technology to reduce the amount of losses in pallet inventories.
2. Adopt RFID technology to control and improve overall asset management, if the Postal Service invests in RFID infrastructure to mitigate pallet losses.

Management's Comments

Postal Service Engineering stated they are exploring RFID along with Global Positioning Systems (GPS) technology for pallet losses and will continue to work with Network Operations to assess the RFID and GPS solutions. Network Operations disagreed that RFID would provide the solution for pallet leakage outside the Postal Service network. Engineering stated that prior to selecting the appropriate solution, interested stakeholders should work together to define data requirements and corresponding actions, to include enforcement roles and responsibilities. See Appendix E for management's comments, in their entirety.

Evaluation of Management's Comments

The U.S. Postal Service Office of Inspector General (OIG) considers management's actions responsive to the findings and recommendations. We welcome the opportunity to work with Engineering, Network Operations, and the U.S. Postal Inspection Service to identify technology that improves asset management internal controls in the most cost-effective manner. We believe RFID can provide the solution for pallet leakage and has valid asset management applications. We will continue to work with Engineering and Operations management to further explain the potential uses.

The OIG considers recommendation one significant, and therefore requires OIG concurrence before closure. Consequently, the OIG requests written confirmation when corrective actions are completed. This recommendation should not be closed in the follow-up tracking system until the OIG provides written confirmation that the recommendation can be closed.

We appreciate the cooperation and courtesies provided by your staff. If you have any questions or need additional information, please contact Miguel A. Castillo, Engineering, or me at (703) 248-2100.

E-Signed by Darrell E. Benjamin, Jr
VERIFY authenticity with Approvelt

Darrell E Benjamin, Jr.
Deputy Assistant Inspector General
  for Support Operations

Attachments

cc: Susan M. Brownell
       Thomas G. Day
       Scott R. Bombaugh
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<u>APPENDIX A: ADDITIONAL INFORMATION</u>

BACKGROUND

Companies frequently use RFID technology to track inventory and manage the supply chain. The technology is based on a relatively simple concept that relies on radio waves to transfer data from a pre-programmed tag to a reader. RFID systems have three primary components:

- Tags — active, passive or semi-passive — that store information.
- Readers — stationary and handheld — that read/write information from the tags.
- A host system with its own hardware, functions, and predefined tasks.

Each tiny RFID chip is connected to an antenna that picks up electromagnetic energy a reader device beams at it. When the chip picks up the energy, it sends back its unique identification number to the reader device, allowing remote identification of the item.

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By relaying data about location to a remote automated reader, RFID technology has the potential to improve the effectiveness of inventory control. Using RFID technology, organizations can track products in the warehouse; on the road; and in planes, trains, ships, and ports. This results in lower costs, heightened efficiencies, and improved customer care. Likewise, the Postal Service can track pallets and trays, as pictured below, to control losses.

Plastic Pallet   *78P Tray*   *74E Tray*

OBJECTIVE, SCOPE, AND METHODOLOGY

Our objective was to determine the opportunities available for the Postal Service to adopt RFID technology to manage assets and lower operational costs.

To assess the potential adoption of RFID technology, we reviewed pallet losses, the cost of implementing RFID technology, and available studies regarding RFID. In addition, we analyzed the current cost of RFID tags and readers and documented the asset management applications of RFID. We also conducted a site visit to the Portland, Oregon District and the plant that is currently using RFID technology in its mail processing operations to evaluate benefits.

We conducted this performance audit from January through December 2008 in accordance with generally accepted government auditing standards and included such tests of internal controls as we considered necessary under the circumstances. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objective. We believe the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objective. We discussed our observations and conclusions with management on November 20, 2008, and included their comments where appropriate.

PRIOR AUDIT COVERAGE

We did not identify any prior audits or reviews related to the objective of this audit.

APPENDIX B: DETAILED ANALYSIS

Opportunity to Control Pallet Losses

The Postal Service has the opportunity to improve asset management to curtail pallet loss. As depicted in Table 1, the Postal Service lost an estimated 6.37 million[2] pallets valued at $127.4 million from FYs 2004 through 2007.

Table 1 – Estimated Pallet Losses, FYs 2004 - 2007

FY	Total Quantity (Pallet Losses)	Average Unit Price	Loss Value
2004	2,000,000	$20.00	$40,000,000
2005	670,000	$20.00	$13,400,000
2006	1,800,000	$20.00	$36,000,000
2007	1,900,000	$20.00	$38,000,000
Total	**6,370,000**		**$127,400,000**

The Postal Service could deploy RFID technology, purchase new pallets with built-in tags, and have the Mail Transport Equipment Service Centers (MTESC) tag its existing pallets to improve inventory management. This would allow the Postal Service to improve control over its pallet inventory and avoid the annual cost of replacing lost pallets. Although the Postal Service previously considered the possible benefits of using RFID technology as part of the Intelligent Mail infrastructure,[3] the reduced cost of the current technology and the potential financial benefits of using the technology to resolve a specific asset management problem provide added justification.

The concept in more detail is as follows:

1. Deploy RFID scanners or infrastructure to 11,685 existing sites that accept and release pallets. The Postal Service would install scanners at vestibules and doors.

2. Purchase new pallets with built-in RFID tags. Vendors would tag newly purchased pallets before delivery to the Postal Service.

3. Tag existing pallets at MTESCs over a projected 5-year period with the majority of the pallet inventory being tagged within the first 2 years of implementation.

4. Track pallets from departure to return to prevent loss their loss.

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[2] Estimated pallet losses for FYs 2004 - 2007. In FY 2008, the Postal Service lost an additional 1.4 million plastic pallets.

[3] The *2003 Intelligent Mail Corporate Plan* indicated the Postal Service would explore the use of RFID tags on unit loads and containers to track mail and manage capital assets. At that time, the Postal Service elected to pursue barcode technologies for tracking purposes due to cost efficiencies.

This scenario would establish an inventory process that captures shipments from MTESCs and plants to mailers at a cost that provides a positive return on investment. The Postal Service could augment the process to provide mailers with incentives to participate in the tracking of pallets by establishing read points on their premises that would validate and update Postal Service data. The Postal Service could also charge mailers deposits for pallets sent to them or assess mailers usage fees to prevent pallet hoarding.

The Postal Service would need to establish a suitable information system for collecting data on the departure and return of tagged pallets and storing this information in a centralized database. The agency could modify its existing systems[4] to contain tag information for this purpose. Also, the Postal Service should develop procedures to determine the mailer's financial responsibility for pallets not returned within a specified time period.

As shown in Table 2, the initial investment cost of deploying RFID technology for pallets is estimated at $40 million.

Table 2 – Initial Investment to Implement RFID Technology[5]

Investment Items	Amount
Installation costs for RFID scanners at 11,023 Post Office drop ship locations – $2,000 per scanner	$22,046,000
Installation costs for RFID 8,977 scanners at 662 plant and transportation sites – $2,000 per scanner	$17,954,000
Total	**$40,000,000**

In subsequent years, it would cost at least $3.5 million for operational items, such as licensing, training, support, servers, and new tags. Additionally, the cost of tagging existing pallets over 5 years is estimated at $5.2 million. Consequently, the Postal Service could save an average of $18 million annually and a total of $127 million[6] over a 10-year period by implementing RFID technology to minimize pallet losses. We estimate the internal rate of return would be 63 percent for an RFID pallet project and the payback period would be less than 3 years. See Appendix C and Appendix D for our cash flow model and assumptions.

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[5] Actual installation costs will vary depending on the number of plants and scanners, and cost per scanner.
[6] Net present value of estimated annual savings over 10-year investment period. See Appendix C.

Other Applications for RFID Technology

Adopting RFID to control pallet loss would create additional opportunities for the Postal Service to control other MTE losses and improve overall asset management. The Postal Service could use the same RFID scanners in the plant vestibules, doors and other read points at no additional investment, but would need to justify annual operating costs of tracking additional items. Additional RFID applications within the Postal Service include:

- Controlling tray losses — 15 million trays lost during FYs 2004 – 2007 valued at over $47,257,229 million.[7] We consider these to be assets at risk.

- Managing MTE — RFID could provide for advance planning to remove excess or cover shortages and reduce time used to manage inventories.

- Instituting mailer penalty for extended use — charging mailers for extended use of mail transport equipment would keep costs lower for compliant mailers and is a common industry practice for rail vans, sea containers, and airline containers.

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[7] Losses associated with 78P and 74E trays. The unit cost averaged $4.00 for 78P trays and $2.00 for 74E trays.

APPENDIX C: CASH FLOW MODEL

Year	1	2	3	4	5	6	7	8	9	10
Baseline pallets purchased in absence of RFID tagging	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000	1,500,000
Pallets purchased after implementation of RFID tagging	1,059,214	237,679	52,128	12,071	3,588	1,926	1,725	1,820	1,969	2,127
Tagging old pallets	-$3,825,216	-$1,065,012	-$270,283	-$66,467	-$16,243	$0	$0	$0	$0	$0
Pallet loss savings	$8,286,112	$25,554,757	$29,923,406	$31,295,864	$32,013,938	$32,595,238	$33,153,907	$33,715,338	$34,285,002	$34,864,076
Implementation costs	-$40,000,000									
Licensing; training; support; servers	-$3,500,000	-$3,559,500	-$3,620,012	-$3,681,552	-$3,744,138	-$3,807,788	-$3,872,521	-$3,938,354	-$4,005,306	-$4,073,396
Net savings	-$39,039,104	$20,930,245	$26,033,112	$27,547,844	$28,253,556	$28,787,450	$29,281,387	$29,776,984	$30,279,696	$30,790,680
Savings discounted	-$36,315,446	$18,111,624	$20,955,628	$20,627,840	$19,680,259	$18,653,160	$17,649,499	$16,696,021	$15,793,389	$14,939,451
Net Present Value (NPV) of savings	**$126,791,426**									
Internal Rate Return	**62.98%**									

APPENDIX D: CASH FLOW ASSUMPTIONS

The cash flow model simulates the flow of plastic pallets through the MTESC and Postal Service system. It assumes that any tagged pallet is immune from loss (or losses can be fully recovered) and any untagged pallet is completely vulnerable to the current loss rate with no deterrent effect. We based the flow rates on data the Postal Service provided. We based the pallet universe on pallet purchases made over the past 10 years and Postal Service data on average MTESC stock over the past fiscal year. It assumes the Postal Service will continue to order 1.5 million pallets per year, every year, based on their orders from the last 5 years.

Key Cash Flow Items	
Total Pallet Universe	12,000,000
Estimated Historical Annual Loss Rate	12.5%
Pallet Cost	$20.00
Tagged Pallet Cost	$20.50
Installation Cost	$40,000,000
Current Yearly Licensing Cost	$3,500,000
Cost of Tagging Old Pallets	$0.50
Postal Service Discount Rate for Low Risk Generative Project	7.5%
Postal Service Escalation Factor for Miscellaneous Costs	1.7%

APPENDIX E: MANAGEMENT'S COMMENTS

UNITED STATES POSTAL SERVICE

December 18, 2008

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1735 NORTH LYNN ST.
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SUBJECT: Draft Audit Report-Radio Frequency Identification Technology Asset Management
(Report Number DA-AR-09–DRAFT)

Thank you for the opportunity to review and comment on the subject draft audit report. Engineering has been and continues to explore opportunities to employ radio frequency identification (RFID) technology in applications where it is cost effective. In addition to passive RFID solutions, Engineering, in cooperation with Network Operations and the Inspection Service, has been working with cellular assisted Global Positioning Systems technology to seed the distribution of pallets to provide valuable insight into specific locations where pallets are leaving the mail supply chain.

RFID represents one of many alternatives available to serialize assets and record location data. There are several technical challenges associated with RFID in the specific implementation recommended by the OIG. Engineering and Network Operations welcome the opportunity to discuss these with the OIG. There is insufficient detail in the audit to validate the assertion that implementation of RFID as proposed will eliminate pallet purchasing as claimed.

Prior to selecting the appropriate auto-identification solution, we should work together to define the data requirements and corresponding actions, to include enforcement roles and responsibilities to guide the selection of the appropriate technology.

Recommendation 1:
Explore opportunities to employ radio frequency identification (RFID) technology to reduce the amount of losses in pallet inventories.

Response
Engineering has done extensive work with RFID technology and stands ready to discuss the functional requirements necessary for a pallet solution as proposed by the OIG. Network Operations will continue to work with Engineering to explore this option along with cellular assisted GPS technology.

Network Operations disagrees with this recommendation. The RFID technology will provide visibility only for the movement of identified MTE within USPS facilities. It does not provide a solution for leakage outside of the postal network.

<u>Recommendation 2</u>:

Adopt RFID technology to control and improve overall asset management, if the Postal Service invests in RFID infrastructure to mitigate pallet losses.

<u>Response</u>

At this time, no decision has been made to deploy RFID technology to mitigate pallet losses. Engineering and Network Operations plan to expand the use of cellular assisted GPS to provide vital location information for pallets that have left our control.

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