



September 30, 2006

WALTER O'TORMEY  
VICE PRESIDENT, ENGINEERING

SUBJECT: Audit Report – Biohazard Detection System Consumables  
(Report Number DA-AR-06-006)

This report presents the results of our self-initiated audit of the U.S. Postal Service's Biohazard Detection System (BDS) consumables (Project Number 05XU001DA000). Our objective was to determine if BDS consumable use, specifically the items consumed during a test cycle, exceeded operational needs.

### **Background**

During 2002, the Postal Service approved a \$279 million Decision Analysis Report (DAR) to develop, purchase, and install BDS at some processing facilities (Phase I). In 2004, the Postal Service approved a DAR modification request for an additional \$253 million to complete the installation at the remaining facilities (Phase II). At the end of 2005, the Postal Service finished installation of 1,373 systems, including contingency units.

BDS is a special set of equipment that acts as an early warning system for the detection of biohazards within the Postal Service processing and distribution center (P&DC) environment. The main purpose of the BDS is to reduce the threat to Postal Service personnel and the general public of biohazardous materials (exclusively, anthrax) sent through the mail.

The BDS units collect air samples from the Automated Facer Cancellor System (AFCS) during mail processing operations and automatically perform periodic tests on the samples. This test cycle occurs every hour and can continually test unattended for a full 10 hours. The BDS is attached to the front end of the AFCS and must be "on" for the mail processing equipment to operate.<sup>1</sup> This feature helps ensure that processed mail is tested for biohazards before the mailpiece leaves the facility.

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<sup>1</sup> An AFCS unit includes two components – a culler at the front of operations attached to a canceller. BDS is only necessary during the culling operation.

During each test cycle, BDS consumes one cartridge and buffer fluids. As depicted in Illustration 1, these items represent the most significant variable costs of a test. According to the DAR, consumables costs are estimated at \$526 million over the BDS' 5-year life.

**Illustration 1. Diagram of Biohazard Detection System**

**Redacted**

The Vice President, Engineering, is responsible for fielding BDS equipment, establishing maintenance policies, and monitoring consumable use. The Vice President, Network Operations, is responsible for managing AFCS and BDS operations.

**Objective, Scope, and Methodology**

Our objective was to determine if BDS consumable use, specifically the items consumed during a test cycle, exceeded AFCS operational needs.<sup>2</sup> Our review was limited to Phase I and Phase II BDS deployments, scheduled through December 2005.

To accomplish our objectives, we compared fiscal year (FY) 2005 BDS test data to AFCS run times to determine consumable over-usage for each machine in our sample. Specifically, we compared the actual BDS tests per day to required tests per day based on AFCS runtimes recorded in end of run reports. In

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<sup>2</sup> Our original scope included a review of contracted preventive maintenance. We plan to review preventive maintenance in a subsequent audit.

selecting a sample for review, we identified the FY 2005 universe of machine test days (175,345) from BDS system data. We randomly selected 80 machine test days per quarter for a total of 320 samples. We computed an average over-testing for each BDS machine per day. See Appendix B for sample information.

We also conducted a follow-up survey relating to 97 randomly selected samples. We distributed the survey to in-plant support managers and supervisors of maintenance operations at 63 BDS sites. The survey was the basis for identifying best practices and contributors to over-testing.

We conducted this audit from November 2005 through September 2006 in accordance with generally accepted government auditing standards and included such tests of internal controls as we considered necessary under the circumstances. We obtained data from the Postal Service End of Run (EOR) reports and BDS system data the vendor provided. We did not test the validity of controls over these systems. However, we conducted a preliminary assessment of data reliability and concluded the data used was sufficiently reliable to answer the audit objectives. We discussed our observations and conclusions with management officials and included their comments where appropriate.

### **Prior Audit Coverage**

The U.S. Postal Service Office of Inspector General (OIG) previously issued a Management Advisory, *Biohazard Detection System* (Report Number DA-MA-02-001, dated September 24, 2002). We recommended the Postal Service continue to search for alternative technologies, conduct a detailed risk assessment, and conduct testing to ensure they can detect several designated biohazards.<sup>3</sup> Management generally agreed with our recommendations and indicated that, even though the BDS is not real-time, it is the only developed system that is reliable and currently available.

### **Audit Results**

The Postal Service's BDS consumable usage exceeded AFCS operational needs. Postal Service policy requires one BDS test for every hour of AFCS operation. However, we found instances where BDS testing occurs continuously even when the AFCS is not operating. This occurred primarily because there was no start and shutdown synchronization between BDS and AFCS operations. As a result of BDS over-testing, by the time a technological solution is implemented the Postal Service will have incurred unrecoverable costs. Reemphasizing already established manual procedures for efficient consumable use will allow some cost avoidance in the short-term. In the long-term, the Postal Service could avoid consumable costs over the remaining BDS program life once

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<sup>3</sup> The scope of this audit included the BDS being piloted by the Postal Service at the time of the audit. Thus, the audit focused on preproduction testing of the system.

they implement a technological solution. The overall monetary impact of BDS over-testing is \$79,739,137 which we will report in our *Semiannual Report to Congress*.

**Sample Results Indicate Biohazard Detection System Over-Testing**

A statistical sample of 320 AFCS machine days indicated that, on average, 2.09 BDS tests per machine per day were unnecessary when compared to AFCS runtimes. Sample results showed the delta for our sample ranged from -10 tests (meaning the BDS conducted 10 fewer tests than would be required based on AFCS runtime) to +11 tests (or 11 more tests than required). To determine causes and best practices, we grouped the delta ranges in the sample into the following three strata:

**Stratum 1** (delta of -10 to -1[shortfall]): In this stratum, AFCS operations exceeded BDS tests. Survey results from 100 percent of sample sites in this category indicated this was not the result of under-testing, but was rather a result of appropriately operating the AFCS canceller function without BDS.

**Stratum 2** (delta of 0 to 1 [excess]): In this stratum, AFCS operations closely mirrored BDS tests. Therefore we identified the “best practices” these sites implemented to achieve this level of efficiency.

**Stratum 3** (delta of 2 to 11 [excess]): In this stratum, BDS tests exceeded AFCS operations, indicating over-testing.

As shown in the table below, our sample analysis of machine days revealed that BDS tests occurred more than necessary over half of the time.

**Table 1. BDS Sample Analysis Results**

Stratum	Number of Occurrences	Percent
1	17	5
2	141	44
3	162	51
<b>Totals</b>	320	100

**Causes of Biohazard Detection System Over-Testing**

Excessive testing occurred because BDS operations are not fully synchronized with AFCS operations. Specifically, the interface between the two systems controls AFCS starts only and was not designed to coordinate both starts and stops between the two systems. This coordination is necessary to optimize efficient use of consumables.

Also, current guidelines<sup>4</sup> require coordination between maintenance and operations for efficient consumable use. Postal Service maintenance employees operate the BDS, while mail handler employees operate the AFCS machines. Because the BDS and AFCS operations are supervised and operated independently, close coordination between these two functions is essential to ensure that the BDS does not operate unnecessarily. Often this coordination does not occur, so BDS sites continue to perform tests and use consumables while the AFCS is not processing mail.

Survey results of BDS and AFCS managers indicated various reasons for excessive BDS testing. Specifically:

- 31 percent of Stratum 3 respondents indicated they did not use mail arrival profile tools. Using mail arrival profiles to schedule BDS operations was identified as a best practice during our audit survey. In some cases, at the start of the tour all BDS systems were turned on regardless of AFCS mail volume. These cases called for limited BDS operations.
- 55 percent of Stratum 3 indicated they leave BDS on when the AFCS is operating in the canceller mode.
- 79 percent of Stratum 3 indicated BDS operates when AFCS is idle.
- 84 percent of Stratum 3 indicated that BDS continues to run during AFCS maintenance.
- Only 48 percent of BDS sites were aware of maintenance directives outlining ways to improve the efficiency of BDS and AFCS operations.

Additionally, while 89 percent of respondents acknowledged the feasibility of having maintenance personnel shut down BDS units when the AFCS is not in operation, many respondents recommended the development of a technological solution.

### **Impact of Technological Solution**

At the start of the audit, Engineering had efforts underway to enhance BDS software and overhaul the AFCS. Neither effort addressed the issues highlighted in this report. During the course of the audit, we discussed opportunities for a technological solution to start and stop BDS in conjunction with the AFCS, thereby eliminating manual coordination between operations and maintenance. Proposals included software and hardware modifications management could

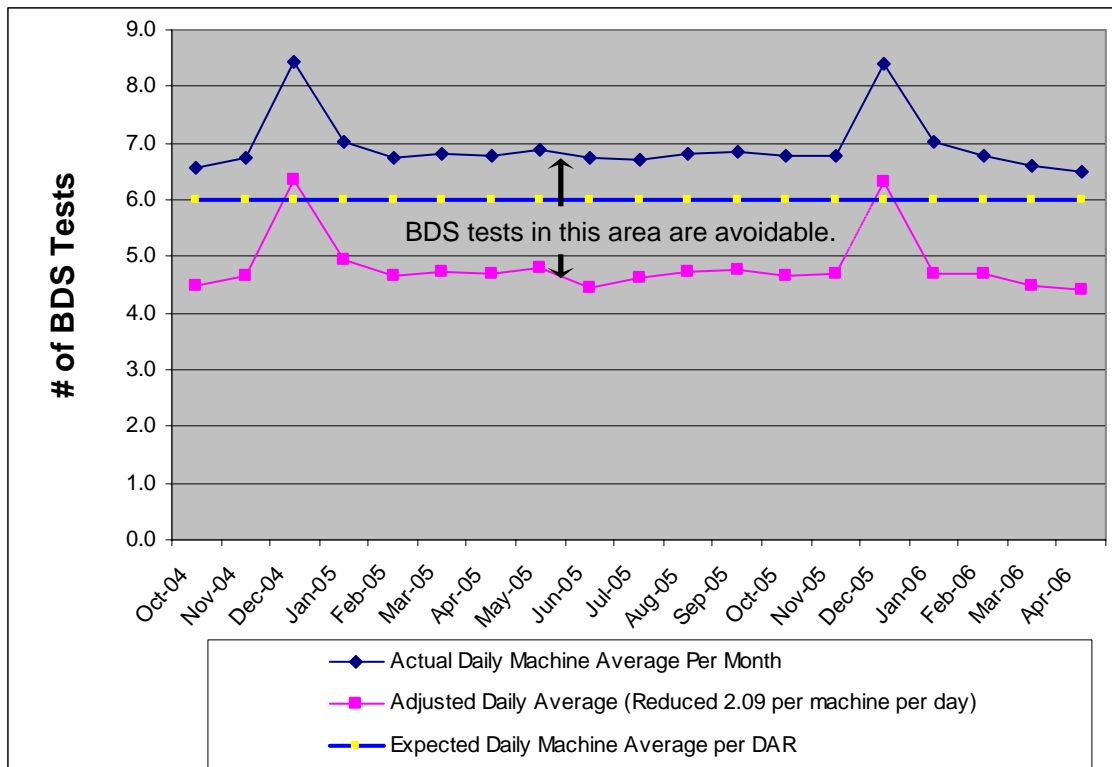
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<sup>4</sup> BDS Consumables Management, Maintenance Management Order MMO-064-04, December 28, 2004.

readily incorporate into current efforts. The expected implementation date for the proposed modifications is the end of FY 2007, at an estimated cost of \$10.5 million.

BDS program management monitors consumable usage by comparing actual usage to DAR expectations rather than to AFCS operational needs. From program inception through April 2006, the average daily consumable usage of 6.9 consumables per machine per day approximates the DAR forecasted usage of 6 per machine per day. Also, over the past 2 years, BDS consumable usage has remained fairly constant except during the holiday period. During this time, usage increased dramatically. However, as discussed earlier, not all the tests were necessary as the BDS was running at times when the AFCS was not processing mail. Implementation of a technological solution would enable the Postal Service to reduce BDS tests and consumable usage by 2.09 per machine per day. (See the chart below.)

**Chart 1. BDS Consumable Usage**



As a result of BDS over-testing, by the time a technological solution is implemented the Postal Service will have incurred \$45,916,184 in unrecoverable costs. Reemphasizing already established manual procedures for efficient consumable use will allow some cost avoidance in the short-term. In the long-term, the Postal Service could avoid \$33,822,953 in consumable costs over the

remaining BDS program life once they implement a technological solution. See Appendix A for details.

### **Recommendations**

We recommend the Vice President, Engineering:

1. Procure and implement a technological solution to ensure Automated Facer Canceller System and Biohazard Detection System operations are synchronized for starts and stops.
2. Reemphasize to the Vice President, Network Operations, the need to follow established manual processes until Engineering implements a technological solution.

### **Management's Comments**

Management agreed with the two recommendations but did not agree with the finding and questioned the monetary impact. Management emphasized BDS was implemented in response to a national emergency in October 2001 and the system was delivered ahead of schedule with the safety of employees and customers as a top priority. Since then, management has explored opportunities to increase the efficiency of the BDS and reduce consumable costs.

While management agreed that a start and stop solution will reduce cartridge use, they stated that the synchronization approach suggested in the audit did not factor in actual field conditions. Therefore, management suggested the savings opportunity within the 5-year BDS life cycle noted in the report would not be fully captured. They further suggested our classification of reported monetary opportunities should be revised after factoring in actual field conditions.

Management further noted that they had already identified a technological solution prior to the beginning of the audit. They indicated that although they developed an interface specification in December 2003, there was insufficient time to incorporate it into the production units.

With regards to recommendation 1, management agreed and noted they also planned additional technological enhancements which, along with increased operational vigilance, would minimize cartridge use. Management estimated their planned upgrades would reduce consumable cost by \$22 million annually. They further stated that planned supply chain management initiatives would save approximately \$50 million over the next 5 years.

Management also agreed with recommendation 2 and planned to develop and issue joint service talks to BDS field offices reemphasizing the importance of, and need to follow, established guidelines to reduce consumable usage. Management's comments, in their entirety, are included in Appendix C.

### **Evaluation of Management's Comments**

We clearly acknowledge that management was highly attentive to the safety of employees and customers in response to a national threat and that BDS systems were deployed expeditiously. However, the intent of this audit was not to assess the overall BDS program, but to focus on just a part of the program – consumable needs.

The synchronization solution discussed in the audit did consider field conditions. We surveyed field in-plant support managers and maintenance operations supervisors at 63 field BDS sites specifically to identify best practices and contributors to over-testing. Those results are noted in the report. Management did not present specific information from a field site or machine level to indicate how their reference to field conditions would impact our calculations, nor did they suggest an alternate calculation methodology. Therefore, we continue to believe our reported monetary impacts, which are supported by statistically sound sampling designs and projections, are fair and reasonable.


Management stated that they had previously identified the opportunity to synchronize the BDS start and stop in conjunction with the AFCS. However, they did not share this information with OIG during the course of the audit, nor present evidence to support this position during the exit conference or subsequent meetings.

While management did not agree with our finding, approach or classification of the monetary impact, they did agree with the recommendations. Management's actions, taken or planned, are responsive to the issues identified in this report. The OIG does not plan to pursue management's disagreement through the formal audit resolution process.

The OIG considers recommendations 1 and 2 significant, and therefore requires OIG concurrence before closure. Consequently, the OIG requests written confirmation when corrective actions are completed. These recommendations should not be closed in the follow-up tracking system until the OIG provides written confirmation the recommendations can be closed.



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

E-Signed by Colleen McAntee   
VERIFY authenticity with Approve!  
*C McAntee*

Colleen A. McAntee  
Deputy Assistant Inspector General  
for Core Operations

Attachments

cc: Tony Pajunas  
Henry Pankey  
Steven R. Phelps

### APPENDIX A. BIOHAZARD DETECTION SYSTEM (Unrecoverable Questioned Costs and Funds Put To Better Use)

<i>Year</i>	<i>Average Excessive Tests per Machine per Day</i>	<i>Average Number of Machines in Use per Processing Day</i>	<i>Machine Processing Days per Year</i>	<i>Number of Excessive Tests</i>	<i>Consumable Unit Cost per BDS Test</i>	<i>Escalation Factor</i>	<i>Cost of Excessive BDS Tests</i>	<i>Estimated Investment Cost of Technological Solution</i>	<i>Net Present Value Excessive BDS Tests</i>
FY 2005				366,520	\$26.74	1.000	\$9,800,751		\$9,800,751
FY 2006	2.09	935	312	609,695	\$26.74	1.000	\$16,303,239		\$16,303,239
FY 2007	2.09	946	312	616,868	\$26.74	1.018	\$16,791,953		\$15,954,349
Period Ending December 2007	2.09	946	78	154,217	\$26.74	1.036	\$4,273,552		\$3,857,845
<b>Sub-Total Unrecoverable Questioned Costs</b>							\$47,169,495		<b>\$45,916,184</b>
FY 2008 (January - September)	2.09	946	234	462,651	\$26.74	1.036	\$12,820,656	(\$10,456,804)	\$2,133,910
FY 2009	2.09	946	312	616,868	\$26.74	1.055	\$17,401,903		\$14,925,553
FY 2010	2.09	946	312	616,868	\$26.74	1.074	\$17,715,138		\$14,436,307
FY 2011 (2 Months)	2.09	946	52	102,811	\$26.74	1.093	\$3,005,668		\$2,327,183
<b>Sub-Total Funds Put to Better Use</b>							\$50,943,365		<b>\$33,822,953</b>
<b>Unnecessary Consumable Use (Unrecoverable Questioned Costs + Funds Put to Better Use)</b>							\$98,112,860		<b>\$79,739,137</b>

**Unrecoverable Questioned Costs** – A cost that is unnecessary, unreasonable, or unsupported; or that is an alleged violation of law, regulation, or contract and is not recoverable.

**Funds Put to Better Use** – Funds that can be used more efficiently by implementing recommended actions.

## **APPENDIX A. Continued**

### **(Unrecoverable Questioned Costs and Funds Put To Better Use)**

#### **NOTES**

- Questioned Costs represent the cost of unnecessary consumables incurred before the proposed implementation of the technological solution. We calculated this by multiplying the total number of excessive BDS tests by the consumable unit cost and escalation factor. Based on contract information, we determined that the consumable unit (variable) cost, excluding program administration, is \$26.74.
- Funds Put to Better Use is the cost of consumables incurred after the proposed implementation of the technological solution. We calculated this by multiplying the number of excessive BDS tests per machine day by the consumable unit (variable) cost escalated and discounted over the program life net of the \$10.5 million cost of the technological solution.
- Full deployment of BDS machines was for 1,373 systems, including contingency units. Deployment completed ahead of schedule (December 2, 2005). The average number of machines post deployment through May 17, 2006 is 946. The weighted average of machine in use prior to full deployment was 935. We used these values for our calculations.
- We calculated the net present value using the discount rate of 5.25 percent over the program life of 5 years.
- The yearly escalation factor is 1.8 percent based on the Postal Service's Decision Analysis Factors, effective May 2006.
- The estimated deployment period for the suggested technological solution is July 2007 through August 2008. Midpoint date used (January 2008) to distinguish funds put to better use assumes even deployment schedule.

## APPENDIX B. STATISTICAL SAMPLING AND PROJECTIONS (Biohazard Detection System Consumables)

**Purpose of the Sampling** - The objective of this audit was to determine whether the BDS consumable use exceeded requirements for AFCS operations. In support of this objective, the audit team employed a stratified random sample to allow projection of the number of excess BDS cartridges used.

**Definition of the Audit Universe** - The audit universe consisted of 175,345 machine-days<sup>5</sup> during FY 2005. The audit universe was obtained from BDS system data provided by the vendor.

**Sample Design and Modifications** - We chose a sample design stratified by fiscal year quarter, because we wanted to cover the potential for differences among the quarters with regard to cartridge overuse. For example, we thought it possible that periods of very high volume might have less overuse of cartridges because longer AFCS run times could result in BDS on/off times more closely matching those of AFCS.

We calculated the sample size based on data obtained from a preliminary sample of 47 randomly-selected combinations of sites, days in FY 2005, and machines (ACFS). We found an achieved precision of 37 percent for the preliminary sample results. From this preliminary result we concluded the coefficient of variation of the data ( $CV_{data}$ ) for the number of excess cartridges in the preliminary sample was 129 percent. Using that observed  $CV_{data}$ , we estimated that a total sample size of 320 would allow us to achieve relative precision of +/- 14 percent. We allocated the sample to 80 machine-day combinations per quarter.

**Statistical Projections of the Sample Data** - For projection of the sample results, we applied the formulae for a stratified random sample from Chapter 3 of Model Assisted Survey Sampling, Särndal, Swensson, and Wretman, 1991.

Based on projection of the sample results, we estimate that a total of 366,520 cartridges were used in excess of need in FY 2005. Because there was less variability in the data than anticipated, we achieved +/- 11 percent relative precision. The 95 percent confidence interval is 325,626 to 407,415 total excess cartridges. From the total of 366,520 excess cartridges, we calculate that the average cartridge overuse rate was 2.09 cartridges per AFCS per day.

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<sup>5</sup> A machine-day is the combination of active AFCS machines (1,274 in FY 2005) and days of operation for each machine (varied by machine). Not all machines operated every day in FY 2005.

## APPENDIX C. MANAGEMENT'S COMMENTS

WALTER O'TORMEY  
VICE PRESIDENT  
ENGINEERING



September 29, 2006

Kim H Stroud  
Director, Audit Reporting  
1735 North Lynn Street  
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Subject: Draft Audit Report – Biohazard Detection System Consumables  
(Report Number DA-AR-06-DRAFT)

This is in response to the subject audit report related to Biohazard Detection System (BDS) Consumables on August 24. Management agrees with the recommendations. However, we do not agree with the audit findings. Last, it should be noted that BDS was implemented in response to a national emergency in October 2001. The USPS aggressively pursued a solution to provide a safe environment for our customers and employees. USPS management wanted integrity in their distribution and delivery networks. With these objectives as a goal, the BDS system was developed, tested, and pre-production systems were delivered to the first USPS field sites within a one and one-half year cycle. Production systems were deployed within one year of the pre-production units. Since then, management has explored opportunities to increase the efficiency of the BDS and reduce consumable costs.

#### Audit Results and Findings:

The report says "A statistical sample of 320 AFCS machine days indicated that, on average, 2.09 BDS tests per machine per day were unnecessary when compared to AFCS runtimes". Using this data, it concludes that over the remaining life of the BDS program, the monetary impact of BDS over-testing is \$79,739,137 which the OIG will report in the Semiannual Report to Congress. The audit concludes that the excessive testing occurred because BDS operations are not fully synchronized with AFCS operations. Finally, it suggests that a technological solution that starts and stops the units in between runs will avoid the over-testing.

Comment: We agree that a start and stop solution will reduce cartridge use. However, the synchronization approach suggested in the report did not factor actual field conditions. As such, the opportunity within the 5-year BDS life cycle will not be fully captured. The classification of reported opportunities should be revised after factoring in actual field conditions.

#### Reference Page 5 Section Titled "Impact of Technological Solution:

In this section, the report states "At the start of the audit, Engineering had efforts underway to enhance BDS software and overhaul the AFCS. Neither effort addressed the issues highlighted in this report. During the course of the audit, we discussed opportunities for a technological solution to start and stop BDS in conjunction with the AFCS, thereby eliminating manual coordination between operations and maintenance."

Comment: The subject audit began on November 21, 2005. Engineering identified this opportunity during the pre-production field test and developed an interface specification in December of 2003 to describe the approach. Unfortunately, due to the urgency of the matter,

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there was insufficient time to incorporate it into the production units. Since then, the synchronization solution was incorporated into the BDS-Dual Collection (BDS-DC) Program. In fact, the BDS-DC Pilot systems deployed to the Baltimore P&DC since February 2006 have it built into the controls.

#### Management Response to Audit Recommendations

##### Recommendation 1

Procure and implement a technological solution to ensure Automated Facer Cancellor System and Biohazard Detection System operations are synchronized for starts and stops.

Management Response: Management agrees with this recommendation. In addition to the synchronized start and stop technology solution, management will combine the start and stop functionality with additional enhancements to minimize cartridge use, along with increased operational vigilance to minimize cartridge use. To this end:

- The BDS-DC program upgrades the BDS cabinets to allow a single cabinet to sample and monitor the air from two AFCS machines. It is estimated this program will reduce consumable costs by \$22 million annually.
- The BDS-DC program also implements the technical solution to synchronize the AFCS and the BDS operations.
- BDS-DC deployment is scheduled to start in August 2007 and finish in September 2008.
- Last, Engineering and Supply Management are in the process of negotiating a five year contract that combines BDS consumables and BDS maintenance efforts. This initiative is expected to save approximately \$50 million over the next five years.

##### Recommendation 2

Reemphasize to the Vice President, Network Operations, the need to follow established manual processes until Engineering implements a technological solution.

Management Response: Management agrees with this recommendation. Processing Operations and Maintenance Policies and Programs agree to develop and issue a joint service talk to BDS field offices. This service talk will reemphasize the importance and need to follow the current established guidelines to reduce consumable usage. At a minimum, the guidelines will include:

- Establishment and adherence to BDS operational schedules.
- Notification to maintenance personnel when starting and stopping AFCS's.
- Proper operation of AFCS's according to mail profiles.
- Proper handling and storage of BDS consumables.
- Re-issuing proper procedures on conducting maintenance of AFCS's without operating the BDS.

The service talk will be issued to field sites no later than November 2006.

Sincerely,

  
Walter O'Tormey

cc: Mr. Pajunas