Audit Report

OIG-12-038

BILL MANUFACTURING: Improved Planning and Production Oversight Over NexGen $100 Note Is Critical

January 24, 2012

This report was revised on January 26, 2012, to adjust the image of the NexGen $100 Note specimen on page 4 to be in conformity with 31 C.F.R. 411.

Office of
Inspector General

DEPARTMENT OF THE TREASURY

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Abbreviations

ACD	Advanced Counterfeit Deterrence Steering Committee
BEP	Bureau of Engraving and Printing
ECF	Eastern Currency Facility
FRB	Board of Governors of the Federal Reserve System
ICD	Interagency Currency Design Group
GAO	Government Accountability Office
MOU	memorandum of understanding
OIG	Office of Inspector General
WCF	Western Currency Facility

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January 24, 2012

Larry R. Felix
Director
Bureau of Engraving and Printing

As part of our ongoing audit of the Bureau of Engraving and Printing's (BEP) production of the NexGen $100 notes, we are issuing this report on our findings with regard to project management. This is the second report issued in connection with our audit.[1]

The Department of the Treasury (Treasury) Office of Inspector General's (OIG) Office of Audit and Office of Investigations are jointly performing this audit to address significant problems encountered by BEP in the production of the NexGen $100 notes and in response to a request from the Department's Assistant Secretary for Management and Chief Financial Officer. Production problems with the NexGen $100 note led to BEP suspending manufacturing of the notes and a decision by the Board of Governors of the Federal Reserve System (FRB) to delay their initial issuance, which had been planned for February 2011. In conjunction with FRB, BEP has been conducting tests to resolve problems before resuming full production.

Our objectives are to assess (1) the planning and implementation of the production process and the events that led to the problems in the production process; (2) the physical security over the notes that have been produced; (3) BEP's plans for the disposition of those notes; and (4) BEP's actions, taken and planned, to address the production problems. We performed our audit fieldwork from December 2010 to October 2011. Because of the coordinated efforts by BEP and FRB involved in the design, development, and

[1] Our first report was *Bill Manufacturing: Improved Security Over the NexGen $100 Notes Is Necessary,* OIG-11-068 (May 13, 2011). This report is available at http://www.treasury.gov/about/organizational-structure/ig/Pages/by-agency-2011.aspx.

production of the NexGen $100 notes, we coordinated our audit with the FRB OIG who will issue a separate report to FRB.[2] Appendix 1 contains a more detailed description of our audit objectives, scope, and methodology.

Results in Brief

We consider the delayed introduction of the NexGen $100 note to be a production failure that potentially could have been avoided and has already resulted in increased costs. We found that BEP did not (1) perform necessary and required testing to resolve technical problems before starting full production of the NexGen $100 note, (2) implement comprehensive project management for the NexGen $100 note program, and (3) adequately complete a comprehensive cost-benefit analysis for the disposition of the approximately 1.4 billion finished NexGen $100 notes already printed but not accepted by FRB.[3] Accordingly, before resuming full production of the NexGen $100 note, we recommend that BEP complete production validation tests to ensure technical problems are resolved. BEP should also implement a comprehensive and integrated project management function for the NexGen $100 note program, as well as for future note designs. In addition, we recommend that BEP, in coordination with FRB, complete a comprehensive cost-benefit analysis before making decisions related to the disposition of the NexGen $100 notes that have not been accepted by FRB.

In response to our audit objective to review the physical security of the NexGen $100 notes, we issued an interim report in May 2011 noting three findings.[4] We plan to issue a separate report to follow up on the recommendations made in that report and to communicate any additional security findings going forward.

[2] The FRB OIG is reviewing the activities of FRB in connection with the NexGen $100 note program.
[3] FRB entered into an agreement with BEP in 2009 for the fiscal year 2010 currency order and agreed to pay $117.98 per 1,000 NexGen $100 notes upon acceptance. Based on the established rate, the charge for the approximate 1.4 billion notes produced is estimated at $165 million. Although FRB has not accepted delivery of these notes, they paid a surcharge that included the costs for producing the notes.
[4] OIG-11-068 (May 13, 2011)

Management Response

In a written response, BEP management provided their corrective actions taken or planned to implement the recommendations. The management response is summarized in the Recommendations section of the report and the text of the response is included as appendix 3.

Because our report refers to FRB's role in the Advanced Counterfeit Deterrence Steering Committee (ACD)[5] and the Interagency Currency Design Group (ICD)[6], we provided a copy of our report to FRB management for comment. In a written response, FRB management stated its support for our recommendations. Even so, FRB commented that it did not believe that the sporadic creasing problem would have been identified during a limited initial production test because the problem was not identified until after a significant number of notes had been printed, far larger than would have been produced for testing purposes. FRB did note that the actions taken in response to our recommendation regarding production validation tests will provide a more effective method to identify and resolve technical problems before beginning full-scale production of any new note designs. However, although the more robust production validation process should substantially reduce unforeseen production problems, it will likely not eliminate them completely. The text of FRB's management response is included as appendix 4.

OIG Comment

We believe BEP's corrective actions, taken and planned, are responsive to our recommendations. With respect to FRB's comment that the sporadic creasing problem would not have been caught by limited initial production tests, we believe it is important to note, as discussed later in this report, that a number of technical

[5] The ACD was formed in July 1982 to coordinate the counterfeit deterrence activities of the various government agencies involved with United States currency. The steering committee is chaired by the Treasury Under Secretary for Domestic Finance, or his or her designee, and is comprised of senior executives from Treasury, BEP, FRB, and United States Secret Service. The current Chair is the Treasurer of the United States.

[6] The ICD was established by the ACD to provide guidance on design and other subjects related to new currency. The ICD includes members from BEP, FRB, and the United States Secret Service.

problems were known and not resolved before the start of full production.

Background

BEP produces billions of United States (U.S.) currency notes for delivery to FRB each year. BEP has two production facilities, the Eastern Currency Facility (ECF), located in Washington, DC, and the Western Currency Facility (WCF), located in Fort Worth, Texas.

The process for design, development, production, and issuance of the NexGen notes is a multi-year effort involving Treasury, BEP, FRB, and the U.S. Secret Service (Secret Service). The ACD coordinates the counterfeit deterrence activities of the agencies and provides recommendations on currency design to the Secretary of the Treasury who has sole statutory authority to approve new currency designs. The ICD was established by the ACD to provide guidance on design and other subjects related to new currency. The ICD met regularly and actively participated in the design and development of the NexGen $100 note.

The NexGen $100 note is the latest denomination of currency to be redesigned with enhanced security features and is considered the most advanced note produced by BEP. Among other things, the new note design has two advanced security features including a 3-D security ribbon woven into the paper and a color-shifting bell in an inkwell, as shown in figure 1.

Figure 1 – NexGen $100 Note

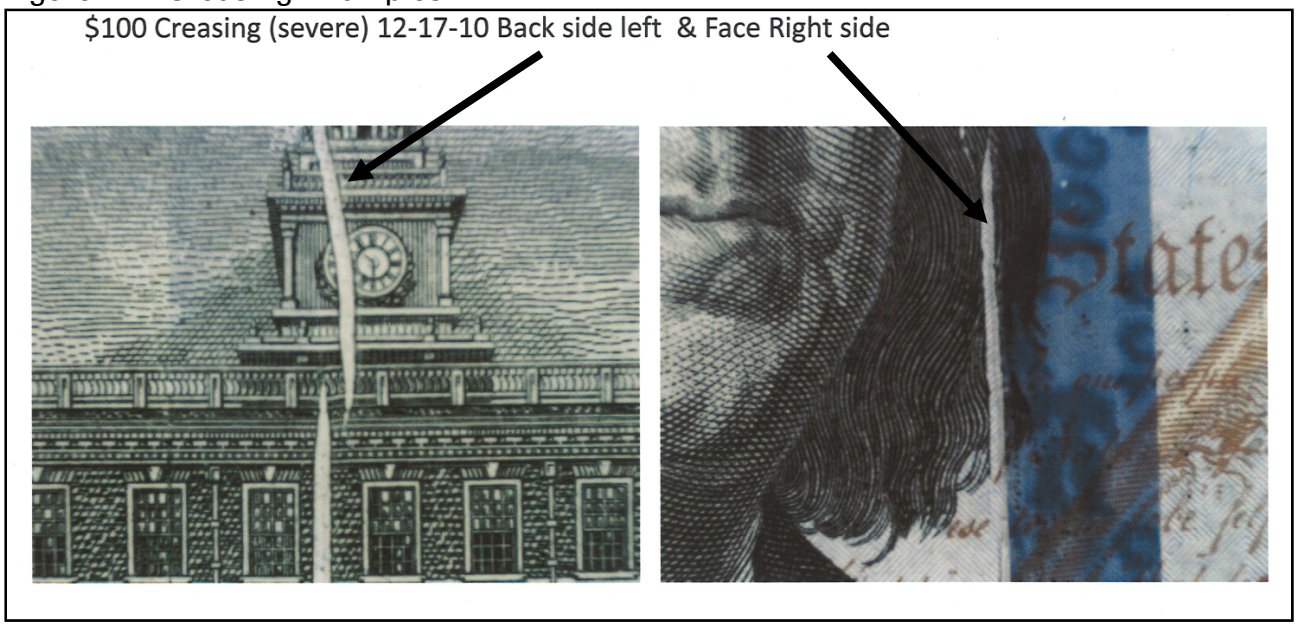
3-D Ribbon Bell in the inkwell

Source: BEP's *The New $100 Note* poster from www.newmoney.gov

BEP began producing the NexGen $100 notes in January 2010, with an anticipated FRB issuance in February 2011. During production, BEP noticed sporadic creasing of the notes in April 2010, and a more concentrated occurrence of creasing in June 2010.[7] Shortly thereafter, in July 2010, BEP began working with the currency paper supplier to determine the cause of the creasing problem. BEP suspended production at WCF in September 2010 and conducted manual/visual inspections of individual notes to obtain data about the extent of the creasing problem.[8] Based on the data gathered, BEP officials estimated that less than 1 percent of the notes produced were flawed. However, that estimate was not based on valid statistical sampling techniques so an exact error rate was not determined.

Figure 2 shows examples of severe creasing found during the inspection.

Figure 2 – Creasing Examples



Source: BEP. Images are magnified

[7] FRB categorized the creasing problems as severe, moderate, and light. Severe creases are easily visible to the naked eye and are evidenced by the folding of the currency paper which, when stretched, will exhibit an opening and show a break in printing. In contrast, moderate creases are less obvious but still visible to the naked eye, whereas light creases typically require magnification to detect.

[8] BEP continued production at ECF, but at a reduced rate.

BEP and FRB officials stated that issuing flawed notes could cause the public to question note authenticity, particularly abroad where U.S. currency is scrutinized more closely. In October 2010, FRB announced a delay in the issuance of the NexGen $100 notes and has not accepted delivery of any of the finished notes. In February 2011, BEP coordinated with FRB, a management consulting firm under contract with FRB, and the currency paper supplier to perform research and testing to understand and address the creasing problem. BEP officials stated that due to the proprietary nature of the supplier's paper manufacturing process, BEP did not receive documentation from the supplier about changes made to the currency paper until a year after BEP brought the creasing problem to the supplier's attention. Accordingly, it was not until BEP received documentation dated June 2011, that it knew the specific changes made to the paper during production in early 2010. The research and tests performed show evidence of certain paper properties that have a strong correlation to creasing, but the tests have not identified the root cause of the problem. Since BEP stopped full production of the notes, the parties developed a production validation plan that, once successful results are achieved, will enable full production to resume. BEP began initial validation in September 2011 with the goal of resuming full production in 2012. Success assumes the technical problems are resolved and agreement to proceed is reached by BEP and FRB.

Appendix 2 contains a timeline of key events related to the design, development, and production of the NexGen $100 notes.

Findings

NexGen $100 Note Production Testing Was Not Sufficient

Following BEP's production problems with a redesigned $50 note in 1997, the Government Accountability Office (GAO), in testimony to the Congress, recommended that the Secretary of the Treasury and FRB limit the initial production of newly designed currency to a quantity necessary to provide reasonable assurance that all

production problems are resolved.[9] GAO also recommended that a written agreement be established that includes the initial production quantity. As a result of the GAO testimony, BEP and FRB signed a memorandum of understanding (MOU) in 1998 stating, among other things, that they would mutually establish a limited initial production quantity of newly designed currency to ensure that all technical problems are identified and resolved prior to full production.

Contrary to GAO's recommendation and the MOU, a limited initial production quantity was not established by BEP and FRB and all known technical problems were not resolved prior to starting full production of the NexGen $100 note. While BEP conducted preproduction testing during 2008 and 2009 of individual design and security features, additional testing of a final approved note design should have been done to ensure that technical problems were resolved. Also complicating matters, the note's security features continued to be modified by the ICD as late as January 2010, the same month that production began. In addition, certain technical problems were identified during development and not fully resolved before full production began.[10] These problems resulted in numerous delays, and when production was scheduled to begin, the start date was not adjusted to add time for the necessary testing of the final note design. Some of the problems encountered in full production were the same ones encountered and not resolved during the development phase.[11]

BEP officials told us that the NexGen $100 note testing process was consistent with practices used on past note designs and they believed that the technical problems they were experiencing could be managed during full production through a continuous improvement effort. They stated that the decision to start production in January 2010 was a judgment call made after evaluating the results of testing performed and the desire to meet a

[9]Testimony before the Subcommittee on Domestic and International Monetary Policy, Committee on Banking and Financial Services, House of Representatives (GAO-T-GGD-98-8, *Printing of Flawed Redesigned $50 Notes*, Oct. 1, 1997).

[10]Among other issues, the ICD documented problems with the 3-D security ribbon and "wrinkling" of the currency paper. In addition, NexGen $100 notes status reports provided to BEP management documented "trash," which are particles of currency paper that would come off during manufacturing and distort the print quality.

[11]The technical problems identified in footnote 10 were also noted during full production in early 2010.

late 2010 NexGen $100 note issuance date being considered at that time.[12]

We believe that not performing tests on a limited initial production quantity to ensure that all technical problems were resolved before starting full production negatively and significantly impacted production, the quality of the final product, and the related costs. The decision to address technical problems during production resulted in, among other things, ongoing modifications to the currency paper by BEP's supplier. BEP officials told us that while no root cause of the creasing problem has been determined, there is a correlation between some of the modifications the supplier made during its currency paper manufacturing process and the propensity of the note to crease. BEP officials stated that the supplier made these modifications in an attempt to rectify problems BEP had in full production. It is unclear why the problems were not resolved early in the process because BEP management and members of the ICD were aware of these problems before full production began, as documented in the ICD meeting minutes and BEP NexGen $100 note status reports. We believe that producing a limited initial quantity to resolve all technical issues would have reduced the chance of producing approximately 1.4 billion notes, with an unknown quantity of which has defects, that FRB has yet to accept.

As mentioned above, BEP is working with FRB and a management consulting firm hired by FRB. Together, they have produced a written production validation plan that, if the results are successful, will allow BEP to resume full production. BEP began initial validation in September 2011 with the goal of resuming full production in 2012. The new production validation plan includes (1) the quantities to be tested, (2) a description of the full range of tests and variables simulating full production, and (3) identified acceptable outcomes. We reviewed the plan, and if properly implemented, we believe it addresses the intent of the MOU for an

[12] In its management response to our report, included as appendix 4, FRB states that it emphasized to BEP that it would not finalize the issue date until the ability to produce the volumes needed to meet domestic and international demand for new NexGen $100 notes was confirmed. According to FRB, it did not make a decision on an issue date until April 2010, shortly before the unveiling of the new NexGen $100 note design at the Treasury Department. In this regard, FRB selected a February 2011 issue date (rather than a late 2010 date) to give the BEP additional time to meet FRB's requirements.

agreed upon limited initial production quantity to resolve technical problems before full production. It should be noted that BEP and FRB have agreed to jointly authorize the decision to resume full production.

NexGen $100 Note Project Management Was Lacking

BEP did not have a comprehensive and integrated process for overseeing the entire scope of the NexGen $100 note program. Program documents we reviewed did not clearly identify processes, milestones, critical paths, and schedule dependencies related to all phases of NexGen $100 note activities, including design, development, public education, production, and note issuance. As a multi-year effort involving multiple agencies and stakeholders, effective project planning of the NexGen $100 note program is critical to control the project scope, schedule, cost, quality, and deliverables. The lack of comprehensive and integrated project management for the NexGen $100 note program is a concern in light of the fact that the note was the most complex redesign of U.S. currency ever and this was not the first time BEP encountered a production failure with a new currency product.

Project management is the discipline of planning, organizing, securing, and managing resources to better ensure the successful completion of specific project goals and objectives. Effective project management involves achieving results while managing constraints, such as scope, time, and budget. The project management concept is commonly used in the private and public sectors to help achieve effective and efficient operations.

BEP officials told us that a project manager was assigned to the NexGen $100 note program from BEP's Office of Product Development and Technology. We found, however, that the role established for the project manager was primarily limited to monitoring product development testing rather than monitoring the overall scope of necessary activities. The project manager kept BEP management and the ICD informed of testing progress. However, as delays were encountered due to technical setbacks and security feature modifications, nobody fully assessed the impact of these events to the program as a whole.

Beginning in 2008, a series of design and development scope and scheduling changes resulted in NexGen $100 note project delays. These changes in scope and schedule continued up until the week that production began in January 2010. The changes were made without adequate analysis by the ICD or BEP to determine their impact on cost, schedule, and deliverables. As discussed earlier, the delays in the design and development phase were so significant that testing of a limited initial production quantity was not performed. The focus was on meeting the proposed NexGen $100 note issuance date rather than doing the necessary testing to ensure that technical problems were resolved and manufacturing was feasible.

Certain interagency agreements established to guide the project management process also need to be revised. Because the note design process has evolved and the design itself is more sophisticated, collaboration between BEP, FRB, and Secret Service has become more critical. As of November 2011, BEP and FRB were negotiating a new MOU to more clearly define their respective roles and responsibilities. In addition, BEP, FRB, and Secret Service, as members of the ICD, are operating under a 2009 draft ICD charter. That document also needs to be reconsidered, and finalized, including clearly defining the members' respective roles and responsibilities for project management. We believe the update and finalization of these documents should be given priority attention.

Cost-Benefit Analysis for the Disposition of Finished NexGen $100 Notes Is Incomplete

There are essentially three options for disposition of the approximate 1.4 billion NexGen $100 notes that have been produced but not accepted by FRB. The options are: (1) destroy and replace all the notes, (2) inspect the notes and destroy only those that are found to be flawed, and (3) circulate the notes as-is after higher quality new notes have been in circulation for a few years. BEP officials stated that the severe creasing problem has made option 3 unfeasible and they plan to pursue option 2 because the cost to inspect and reclaim the good notes is less than option 1, destroy and replace all the notes.

Early in our audit, BEP did not have a cost-benefit analysis supporting its preferred option, to inspect the notes and destroy only those that are found to be flawed. In response to our repeated requests, BEP provided piecemeal information over a period of several months in support of its favored disposition decision. For example, BEP provided information documenting that the cost to replace the notes is between approximately $78 million and $92 million depending on spoilage levels during production. That would be in addition to the cost to destroy the notes, which BEP estimates at approximately $800,000. Based on the documents provided, BEP officials stated that the combined costs to destroy and replace the notes exceed the costs of option 2, inspect the notes and destroy only those that are flawed. The information provided is still incomplete as it does not identify all costs, benefits, and risks associated with option 2.

Under option 2, the completed notes slated for inspection are already in cut, single-note form. However, BEP's current technology and equipment cannot detect creasing in the notes. BEP officials told us that they have begun acquisition planning to procure new single-note inspection equipment capable of detecting creasing. A contract award is expected in 2012. BEP estimates total costs in excess of $15 million for the purchase and installation of the equipment. However, BEP officials told us that, at this time, it is unclear whether the existing single-note inspection technology can detect another flaw that has been observed in the finished NexGen $100 notes, "crow's feet."[13] In fact, BEP officials stated it is unlikely that the single-note inspection equipment will detect crow's feet. Additionally, at the time of our audit, FRB's position was that it would not accept any notes that had a creasing problem. This raises another issue that needs to be considered before purchasing the single-note inspection machines. That is, BEP officials stated that if the tolerance levels of the single-note inspection machines are set to detect all creasing, there could be a significant number of notes that would be falsely rejected by the machines (i.e., notes that meet quality standards are rejected). Accordingly, the cost involved

[13] Crow's feet are defects which occur in the paper surrounding the 3-D security ribbon. They appear as small wrinkles or creases that initiate at the ribbon and grow outward at a small angle. According to BEP officials, the paper supplier has implemented a process change that is anticipated to eliminate crow's feet going forward.

with false rejects and the quality standards that are ultimately established must be factored into any cost-benefit analysis. Our review also noted that the cost to replace the notes and the cost to inspect the notes do not include labor costs.

Until these matters are resolved, we believe it is premature for BEP to purchase the single-note inspection equipment. We also believe that option 1, destroy and replace the notes, needs to be further considered in the cost-benefit analysis.

BEP officials told us that it will take about 2 years before final disposition of the notes occurs. In the interim, BEP will need to secure and store the existing notes as well as, once production resumes, new NexGen $100 notes. BEP officials have stated that adequate vault space is an ongoing concern and BEP is in the process of addressing storage issues. BEP should ensure that costs and risks associated with note storage are also included in any cost-benefit analysis.

Recommendations

We recommend that the Director of BEP:

1. Ensure BEP completes production validation in conjunction with FRB on an agreed-to limited initial production quantity of NexGen $100 notes, and that technical problems are resolved before resuming full production.

   Management Response

   BEP, Secret Service, and FRB agreed on a production validation strategy on August 9, 2011. The parties agreed to conduct a staggered production validation on the press lines, which would evolve into uninterrupted production if established review criteria are successfully met. Production validation will start on one production line at the WCF and continue to a second line if the first line is successful. Later, one line at ECF will be added. BEP may put a third line through the production validation process at the WCF if all goes well, and BEP and the paper supplier have available production capacity. BEP will not print

the NexGen $100 note on any production line without first putting the line through the production validation process.

OIG Comment

BEP's planned actions meet the intent of the recommendation. That said, BEP will need to record an estimated date for completing its planned actions in the Joint Audit Management Enterprise System (JAMES), Treasury's audit recommendation tracking system.

2. Ensure BEP implements a comprehensive, integrated project management function, in conjunction with FRB, Secret Service, and other relevant stakeholders, for the current NexGen $100 note program and all future note designs. In this regard, input from the FRB, Secret Service, and other relevant stakeholders is necessary to ensure all aspects of the NexGen and other future note products are considered, including preproduction testing, production validation, the public education campaign, and issuance efforts. In addition, BEP, in coordination with its interagency partners, should update and finalize the 1998 MOU with FRB and the 2009 ICD draft charter.

Management Response

BEP will implement a comprehensive, integrated project management function for future note designs by creating a new design control process that includes staff from FRB and Secret Service as key team members. BEP implemented a production validation protocol in collaboration with the FRB and Secret Service to ensure preproduction testing met agreed upon standards for the NexGen $100 note program prior to returning to production. ICD will continue to coordinate with all relevant stakeholders for the NexGen $100 note release date to ensure the public education program managed by FRB is incorporated into BEP's production plans. In addition, a draft ICD charter will be presented to the ICD members in March 2012. All comments will be incorporated and presented at the May 2012 ICD meeting for final approval. BEP and FRB are negotiating the final terms of the MOU and expect completion by March 31, 2012.

OIG Comment

BEP's actions, taken and planned, meet the intent of the recommendation. BEP, in coordination with its interagency partners, updated and finalized the 1998 MOU in December 2011. We consider this recommendation to be open until after the ICD charter is approved and BEP executes all aspects of the comprehensive, integrated project management function for the NexGen $100 note.

3. Ensure that before awarding a contract to purchase single-note inspection equipment, BEP completes a comprehensive cost-benefit analysis including all costs, benefits, and risks of the available options for the disposition of the approximate 1.4 billion finished notes that have not been accepted by FRB. Among other things, the analysis should consider the capability of the single-note inspection equipment to ensure notes meet quality standards for acceptance by FRB, as well as costs associated with things such as false rejects and labor. The option selected should be agreed to by all parties (e.g., FRB, Secret Service) and be made as expeditiously as possible.

Management Response

BEP expects to issue a request for proposal for the single-note inspection equipment that will include a provision requiring the vendor to demonstrate the capability to meet the FRB's quality standards. BEP will also ensure that these requirements are acceptable to the Secret Service.

Since January 2011, FRB has worked with BEP regarding the use of the single-note inspection equipment to process the NexGen $100 notes currently on hold. The business case for the request for proposal indicates that a recovery rate as low as 30 percent justifies the acquisition of the equipment. Notably, BEP observed a 90 percent plus recovery rate during the BEP's hand inspection of NexGen $100 notes. In addition, BEP's long-term strategy of using the single-note inspection equipment for note reclamation further supports the acquisition.

OIG Comment

BEP's planned actions generally meet the intent of the recommendation. However, BEP will need to complete a comprehensive cost-benefit analysis including all costs, benefits, and risks of the options for the disposition of the finished notes. BEP will need to record an estimated date for completing its planned actions in JAMES.

* * * * * *

We appreciate the courtesies and cooperation extended by your staff as we inquired about these matters. Major contributors to this report are listed in appendix 5. A distribution list for this report is provided as appendix 6. If you wish to discuss this report, you may contact me at (202) 927-5904.

/s/
Kieu T. Rubb
Director, Procurement and Manufacturing Audits

The objectives of our on-going audit of the Bureau of Engraving and Printing (BEP) NexGen $100 note program are to assess (1) the planning and implementation of the production process and the events that led to the problems in the production process; (2) the physical security over the notes that have been produced; (3) BEP's plans for the disposition of those notes; and (4) BEP's actions, taken and planned, to address the production problems. This report focuses on objectives 1, 3, and 4.

To accomplish our audit, we conducted fieldwork at BEP's Western Currency Facility (WCF) in Forth Worth, Texas; BEP's Eastern Currency Facility (ECF) in Washington, DC; and the Board of Governors of the Federal Reserve System (FRB) offices in Washington, DC. We conducted our fieldwork from December 2010 through October 2011. Our audit scope covered the period from January 2007 to October 2011.

To accomplish our audit objectives we performed the following work:

- In coordination with the FRB Office of Inspector General, we interviewed key BEP and FRB personnel involved with the design, product development, production, and security of the notes.

- We conducted walk-throughs at both WCF and ECF to gain an understanding of the production process and observe security practices in place.

- We reviewed the Government Accountability Office's 1997 testimony before the Congress regarding BEP's production problems encountered with the design of the $50 note. We reviewed the testimony to gain an understanding of issues that were relevant to the redesign and production of the NexGen $100 note.

- We requested cost-benefit analysis information from BEP related to the planned disposition of the approximate 1.4 billion finished notes that have not been accepted by FRB. Early in our audit, BEP did not have a plan. However, as piecemeal information was provided during the course of our audit, we reviewed the information to assess the adequacy of BEP's analysis and related disposition decisions.

- We reviewed minutes related to the NexGen $100 note program from meetings of (1) BEP management, (2) the Interagency Currency Design Group (ICD), and (3) the Advanced Counterfeit Deterrence Steering Committee, to gain an understanding of the events and decisions made by BEP and its interagency partners in the design, development, and production of the note.

- We reviewed the 1998 memorandum of understanding between FRB and BEP, and a draft of the 2009 ICD charter that defines the operating guidelines for BEP, FRB, and the United States Secret Service related to the design and development of currency.

- We assessed BEP's actions based on internal policies and procedures, and other interagency documents related to the design, product development, production, and security of the notes.

We conducted this performance audit in accordance with generally accepted government auditing standards. 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 objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Appendix 2
Timeline of Key Events

Time Period	Key Event
2000	• NexGen redesign project initiated.
September 2007	• The Secretary of the Treasury provides preliminary approval for the design concept of NexGen $100 note.
2007 – 2010	• The Interagency Currency Design Group (ICD) coordinates product development testing on various design and security features of the NexGen $100 note.
August 2009	• The Board of Governors of the Federal Reserve System (FRB) places the fiscal year 2010 order for the NexGen $100 note.
October 2009	• ICD meeting minutes discuss removing a security feature from the NexGen $100 note. • NexGen $100 note status reports provided to Bureau of Engraving and Printing (BEP) management document problems with "trash" during preproduction testing.
November 2009	• ICD and the Advanced Counterfeit Deterrence Steering Committee meeting minutes document technical setbacks with the NexGen $100 note including, among other things, problems with the 3-D security ribbon and "crinkling." • ICD meeting minutes discuss adding a new security feature to the note. Given the short timeframe before production is planned to start, adequate testing of the feature is not feasible without moving the production start date. BEP representatives express concern about adding the feature without adequate testing due to the potential for unintended consequences. ICD minutes document that if BEP were to incorporate the feature, they would need a letter from FRB instructing them to do so.
December 2009	• FRB approves quality standards for the NexGen $100 note on December 18, 2009.
January 2010	• BEP experiences problems with the 3-D security ribbon; however, ICD considers the problem "within limits" and states BEP will continue to monitor the issue with the goal that the paper supplier will help resolve the problem. • BEP receives concurrence from FRB and the United States Secret Service to add the new security feature assuming the risks involved with only limited preproduction testing. Concurrence was reached by the parties during the same week that production begins at BEP's Eastern Currency Facility (ECF) in Washington, DC. • BEP starts production at ECF on January 12, 2010, and at the Western Currency Facility (WCF) in Fort Worth, Texas on January 26, 2010. • BEP experiences problems with "trash" during production.
April 2010	• NexGen $100 note design unveiling takes place April 21, 2010, and a February 10, 2011, issuance date is announced. • WCF notes sporadic creasing of the currency paper. At the time, the occurrence of creasing is not considered significant.
June 2010	• WCF notes a higher occurrence of creasing.
July 2010	• ECF reports creasing, but at a lower occurrence level than at WCF. • BEP is working with the paper supplier to determine the cause of the creasing problem; the supplier stops NexGen $100 note paper production.

Time Period	Key Event
August 2010	• ECF and WCF report to the ICD that creasing has become a significant problem at both facilities. • BEP notifies Department of the Treasury officials of the creasing problem. • BEP begins a series of tests aimed at resolving the creasing issue.
September 2010	• WCF stops production on September 2, 2010, because of creasing. • ECF continues to run one production line, but closely scrutinizes the quality of the notes. ECF uses the rule of thumb that if 50 percent of the sheets in a load crease, the load will be removed from the production stream. • Manual/visual inspection of the NexGen $100 notes begins and continues through December 2010. The goal of the inspection is to gather data on the creasing problem. • During the manual/visual inspection BEP notes "crow's feet" defects in some of the NexGen $100 notes. Crow's feet are defects which occur in the paper surrounding the 3-D security ribbon. They appear as small wrinkles or creases that initiate at the ribbon and grow outward at a small angle.
October 2010	• FRB announces, on October 1, 2010, a delay in the issue date of the NexGen $100 note. • ICD agrees that single-note inspection equipment is required to effectively and consistently inspect and identify creased notes.
February 2011	• FRB modifies an existing contract with a management consulting firm to, among other things, evaluate the paper creasing issue.
June 2011	• BEP's paper supplier prepares documentation, dated June 7, 2011, disclosing changes made to the NexGen $100 note currency paper during production in early 2010.
September 2011	• Production validation begins using the validation plan established by BEP and FRB, in consultation with FRB's management consulting firm.

DEPARTMENT OF THE TREASURY
BUREAU OF ENGRAVING AND PRINTING
WASHINGTON, D.C. 20228

DEC 22 2011

MEMORANDUM FOR **MARLA A. FREEDMAN**
ASSISTANT INSPECTOR GENERAL FOR AUDIT

THROUGH: Rosie Rios /s/
Treasurer of the United States

FROM: Pamela J. Gardiner, Deputy Director /s/
Bureau of Engraving and Printing (BEP)

SUBJECT: Management Response to Draft Interim Audit Report –"Improved Planning and Production Oversight Over NexGen $100 Note Is Critical"

Thank you for the opportunity to respond to the draft interim audit report entitled, "Improved Planning and Production Oversight Over NexGen $100 Note is Critical," dated November 18, 2011. The Bureau of Engraving and Printing (BEP) offers the following response to the draft interim audit report.

OIG Finding 1: NexGen $100 Note Production Testing Was Not Sufficient

OIG Recommendation 1: Ensure BEP completes production validation in conjunction with FRB on an agreed-to, limited, initial production quantity of NexGen $100 notes, and that technical problems are resolved before resuming full production.

> **BEP Response:** On August 9, 2011, the BEP, the USSS and Federal Reserve Board (FRB) staff agreed upon a production validation strategy. The parties agreed to conduct a staggered production validation on the press lines, which would evolve into uninterrupted production if established review criteria are successfully met. Production validation will start on one production line at the WCF and continue to a second line if the first line successfully completes the production validation process. Later, one line in Washington, DC will go through production validation. BEP may put a third line through the production validation process at the WCF, if all is going well and BEP and Crane have available production capacity. BEP will not print the NexGen $100 note on any production line without first putting that line through the above described production validation process.

OIG Finding 2: NexGen $100 Note Project Management Was Lacking

OIG Recommendation 2: Ensure BEP implements a comprehensive, integrated project management function, in conjunction with the FRB, the USSS, and other relevant stakeholders, for the current NexGen $100 note program and all future note designs. In this regard, input from the FRB, the USSS, and other relevant stakeholders is necessary to ensure all aspects of the NexGen $100 note and other future note products are considered, including preproduction testing, production validation, the public education campaign, and issuance efforts. In addition, the BEP, in coordination with its interagency partners, should update and finalize the 1998 MOU with the FRB and the 2009 ICD draft charter.

BEP Response: The BEP will implement a comprehensive, integrated project management function for future note designs by creating a new design control process that includes staff from the FRB and the USSS as key team members. The BEP implemented a production validation protocol in collaboration with the FRB and USSS to ensure preproduction testing met agreed upon standards for the NexGen $100 note program prior to returning to production. The ICD will continue to coordinate with all relevant stakeholders for the $100 NexGen release date to ensure the public education program managed by the FRB is incorporated into BEP's production plans. In addition, a draft ICD charter will be presented to the ICD members in March 2012. All comments will be incorporated and presented at the May 2012 ICD meeting for final approval. In addition, the BEP and FRB are negotiating a final version of the MOU, which is expected to be complete by March 31, 2012.

OIG Finding 3: Cost-Benefit Analysis for the Disposition of Finished NexGen $100 Notes Is Incomplete

OIG Recommendation 3: Ensure that before awarding a contract to purchase single-note inspection (SNI) equipment, BEP completes a comprehensive cost-benefit analysis including all costs, benefits, and risks of the available options for the disposition of the approximate 1.4 billion finished notes that have not been accepted by the FRB. Among other things, the analysis should consider the capability of the SNI equipment to ensure notes meet quality standards for acceptance by the FRB, as well as costs associated with things such as false rejects and labor. The option selected should be agreed to by all parties (e.g., FRB, USSS) and be made as expeditiously as possible.

BEP Response: The BEP expects to issue a Request for Proposal (RFP) for SNI equipment that will include a provision requiring the vendor to demonstrate the capability of the inspection equipment to meet the FRB's quality standards. The BEP will also ensure that these requirements are acceptable to the USSS.

Since January 2011, the FRB has worked with the BEP regarding the use of SNI equipment to process the NexGen $100s currently on hold. The SNI business case, required for the RFP, indicates that a recovery rate as low as 30 percent justifies the acquisition of the SNI equipment. Notably, BEP observed a 90 percent plus recovery rate during the BEP's hand inspection of NexGen $100s. In addition, BEP's long-term strategy of using the SNI equipment for internal reclamation needs further supports the acquisition.

BOARD OF GOVERNORS
OF THE
FEDERAL RESERVE SYSTEM
WASHINGTON, D.C. 20551

LOUISE L. ROSEMAN
DIRECTOR
DIVISION OF
RESERVE BANK OPERATIONS
AND PAYMENT SYSTEMS

January 11, 2012

Ms. Kieu T. Rubb
Director, Procurement and Manufacturing Audits
Office of Inspector General
The Department of the Treasury
Washington, DC 20220

Dear Ms. Rubb:

We appreciate the opportunity to review the Office of Inspector General's draft report to the Director of the Bureau of Engraving and Printing (BEP), entitled *Improved Planning and Production Oversight Over NexGen $100 Note Is Critical*. The draft report includes three recommendations, all of which we support. We offer a few comments for consideration relating to the recommendations and one clarifying point relating to the BEP's focus on production to meet the Board's issue date.

The report recommends that the BEP complete production validation and ensure that technical problems are resolved before resuming full production. The BEP and Board staffs, in collaboration with the Board's contractor, have defined a new production validation process that the BEP is implementing for each NexGen $100 note production line and will implement for future designs. We expect that this process will provide a more effective method to identify and resolve technical problems before beginning full-scale production of any new note designs.[1] Although the more robust production validation process should substantially reduce unforeseen production problems, it will likely not eliminate them completely. The new currency quality assurance program, however, should enable the BEP to identify problems more quickly and reduce the time required to resolve them.

The report also recommends that the BEP implement a comprehensive, integrated project management function, in conjunction with the Board, Secret Service, and other relevant stakeholders. We believe such a project management function is critical and that including all relevant stakeholders is essential to support the work of the Advanced Counterfeit Deterrence Steering Committee (ACD) in making design recommendations to the Secretary of the Treasury. The BEP and the Board finalized their revised memorandum of understand (MOU) in December

[1] The new process replaces the requirement in the 1998 memorandum of understanding between the Board and the BEP that the two agencies agree to a limited initial production quantity of newly designed currency before starting full-scale production. We do not believe that the sporadic creasing problem would have been identified during a limited initial production test because the problem was not identified until after a significant number of notes had been printed, far larger than would have been produced for the test.

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2011, and we support ACD approval of a final Interagency Currency Design Group charter that is consistent with the requirements in the new MOU.

We also support the report's third recommendation that the BEP complete a comprehensive cost-benefit analysis before awarding a contract to purchase Single-Note Inspection (SNI) equipment. We have encouraged the BEP to incorporate in the RFP very clear technical specifications and performance requirements for the equipment and sensor(s), and to consult with Board staff before finalizing any decision regarding the purchase of SNI equipment.

Finally, your report states that the BEP started full production of the NexGen $100s in January 2010 in a desire to meet a late 2010 issuance date then being considered. We emphasized to the BEP that we would not finalize the issue date until we received its confirmation that it could produce the volumes needed to meet domestic and international demand for new $100 notes. In fact, we did not make our decision until April 2010, shortly before the unveiling of the new NexGen $100 design at the Treasury Department. We selected a February 2011 issue date (rather than a late 2010 date) specifically to give the BEP additional time to meet our requirements.

We thank the review team for its consideration of our comments, and for incorporating many of our technical comments provided to the review team on a prior version of the draft report.

Sincerely,
/s/

Office of Audit

Deborah L. Harker, Audit Manager
Gregory J. Sullivan, Jr., Auditor-in-Charge
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The Department of the Treasury

Deputy Secretary
Treasurer of the United States
Assistant Secretary for Management and Chief Financial Officer
Office of Strategic Planning and Performance Management
Office of Deputy Chief Financial Officer, Risk and Control Group

Bureau of Engraving and Printing

Director
Audit Liaison

Office of Management and Budget

OIG Budget Examiner

Board of Governors of the Federal Reserve System

Inspector General
Director, Division of Reserve Bank Operations and Payment Systems

Department of Homeland Security

Acting Inspector General
Director, United States Secret Service