

**STATEMENT OF LARRY R. FELIX**  
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**Before the Subcommittee on Domestic**  
**Monetary Policy and Trade**  
**Committee on Financial Services**  
**U.S. House of Representatives**  
**June 11, 2014**

Good morning Chairman Campbell, Ranking Member Clay, and distinguished Members of the Subcommittee. Thank you for holding this hearing and inviting me to testify before you today about transformative initiatives underway at the Bureau of Engraving and Printing (BEP).

**Mission/Vision**

The mission of the BEP is to develop and produce United States currency notes, trusted worldwide.

The BEP is the security printer for the United States Government, and we provide technical assistance and advice to other Federal agencies in the design and production of security documents, which because of their inherent value or other characteristics, require counterfeit deterrence. The BEP also reviews cash destruction and unfit currency operations at Federal Reserve Banks. As a free service to the public, the BEP processes claims for the redemption of mutilated paper currency. Other BEP activities include engraving plates and dies, and manufacturing inks.

The vision of the BEP is to maintain its position as a world-class securities printer, providing our customers and the public superior products through excellence in manufacturing and technological innovation.

**Overview**

The BEP produces security documents on behalf of other federal agencies; however, our primary product is Federal Reserve notes. The BEP was established and began producing currency in 1862. Authority conferred upon the Secretary of the Treasury under 31 U.S.C. § 321(a) (4) and

§ 5114 allows the BEP to engrave and print currency and other security documents. BEP operations are financed by means of a revolving fund, which was established in 1950 in accordance with Public Law 81-656. This fund is reimbursed through product sales for direct and indirect costs of operations including administrative expenses. In 1977, Public Law 95-81 authorized the BEP to include an amount sufficient to fund capital investment and to meet working capital requirements in the prices charged for products. This eliminated the need for annual appropriations.

The BEP has a diverse workforce, with two facilities operating in Washington, DC and Fort Worth, Texas. Each facility is capable of producing all banknote denominations. On average, the BEP produces approximately seven billion Federal Reserve notes per year. The Fort Worth facility produces 60 percent of the annual production order, while the Washington facility produces the other 40 percent.

The primary reason that Federal Reserve notes are redesigned is to deter counterfeiting. Securing U.S. currency requires strong designs, aggressive law enforcement and an educated public. The BEP works collaboratively through the Advanced Counterfeit Deterrence Steering (ACD) Committee with the Board of Governors of the Federal Reserve System (the Board), the United States Secret Service (USSS), and the Department of the Treasury to improve the counterfeit deterrent features in Federal Reserve notes. The ACD Committee recommends new Federal Reserve note designs to the Secretary of the Treasury.

### **Currency Redesign Program**

In the mid-1990s, the U.S. Government introduced the first major redesign of U.S. currency in 65 years. The design changes were needed to combat the emergence of a new category of counterfeiters who were using computers, scanners, color copiers and other innovative technologies to replicate notes. To stay ahead of the threats to our currency from increasingly sophisticated reprographic technology, the U.S. Government must continuously develop new currency designs with state-of-the-art security features. This means that the BEP must continually develop new security features and currency designs to be ready to respond to developing counterfeiting threats.

On April 21, 2010, the U.S. Government unveiled the last banknote in the most recent currency redesign series, the next generation (NXG) \$100 note. The NXG \$20, \$50, \$10 and \$5 notes were introduced into circulation in 2003, 2004, 2006 and 2008, respectively. The redesigned \$100 note entered circulation on October 8, 2013. The redesign of the \$100 note marked the completion of a multi-year initiative to undertake the most ambitious currency redesign in U.S. history. The innovative security features in the new note are the fruit of more than a decade of research and development focused on protecting U.S. currency from counterfeiting. While

retaining the traditional look of U.S. currency, the new \$100 note incorporates advanced technology to combat counterfeiting. There are several layers of security features in the redesigned \$100 note, including two new public security features: the 3-D Security Ribbon and the Bell in the Inkwell. The 3-D Security Ribbon is a blue ribbon on the front of the \$100 note with images of bells and 100s. When the note is tilted up and down, the bells and 100s move side-to-side. If the note is tilted from side to side, the bells and 100s move up and down. This security feature, which includes more than 700,000 micro-lenses per note, is woven into the paper, not printed on it. The Bell in the Inkwell is a color-shifting bell, inside a copper inkwell, on the front of the note. The inkwell and bell are both copper until the note is moved. When tilted, the bell changes from copper to green, an effect that makes the bell seem to appear and disappear within the inkwell. The latest counterfeiting data indicates that the 3-D Security Ribbon and the Bell in the Inkwell are effective counterfeit deterrent measures for threats posed to the \$100 note.

The NXG series, including the new \$100 note, contain an array of counterfeit deterrent security features, some of which are visible and easily recognizable to the public (micro-printing, raised printing, symbols of freedom, a watermark, security thread and color shifting ink) and some of which are covert or machine readable only. The redesigned notes also include a digital counterfeit deterrent system that was developed under the auspices of the Central Bank Counterfeit Deterrence Group (CBCDG) to thwart digital counterfeiting. The CBCDG digital counterfeit deterrent system, which is being used in a number of countries, relies on a hidden 'marker' embedded in the note's design that can be read or detected by software deployed in digital printers.

### **NXG \$100 Note**

The NXG \$100 note currency paper is unlike that used for all other denominations. It is a composite of paper and plastic. The optically variable thread (the 3-D security ribbon) is a ¼ inch wide plastic strip that is woven into each sheet. The new 3-D security ribbon feature is unique to U.S. currency. The ribbon is wider, more complex, and more visible than similar ribbons used by other countries. Working with this paper on legacy printing and processing equipment at both the BEP and its paper supplier was and continues to be a challenge. BEP continues to study the options for renovation/replacement of the Washington, DC facility.

### **NXG \$100 Note Production**

During the summer of 2010, an issue with sporadic creasing of the paper during printing of the NXG \$100 note was detected. By September 2010, this issue was severe and NXG \$100 note production was suspended. At that time, there was no existing technology available to detect creasing and no obvious cause of, or solution to, the problem. Resolving this complex problem

required collaboration among the BEP, the Board, the USSS, and the paper supplier, Crane & Co.

Root cause investigation at the BEP and Crane revealed important contributors, which included variation in the leading edge of a sheet of paper, the length of time between paper manufacture and printing, the paper's moisture content, and the amount of recycled material in the paper. The paper manufacturer was given more detailed specifications and made several process changes. BEP personnel developed an innovative printing press set-up involving "bowing" of the normally straight press front lay and modification of front lay stops, including changes to the configuration of machinery and modifications to the manufacturing process. These changes dramatically increased robustness of the printing process and resulted in significantly reduced rates of creasing. The BEP also developed and installed four additional high-resolution cameras to inspect the sheets for creasing on its automated, high-speed inspection lines. This system identifies and rejects sheets with creases.

Once the changes were made and tested, a path forward included a robust production validation process that was agreed to by the BEP, the Board, and the USSS. This process involved examining and verifying raw material improvements, press modifications, and the creation of a crease detection system prior to returning to full-scale production with a manageably low level of creasing.

In June 2013, the BEP delivered a very small amount of mashed notes, less than 0.5 percent, intermixed with good notes to the Board. Mashing is caused when excess ink on an engraved plate is transferred to the paper resulting in a blurry image. The BEP has acquired machines to sort these notes and reject those that do not meet quality standards. The BEP is building a more robust quality assurance system to address the technical/production/quality issues that became evident with the development and manufacture of the redesigned \$100 note and to better prepare for more complex future designs. Through our Currency Quality Assurance (CQA) program, we are developing a more robust design process that provides for improved material specifications and design for manufacturability. The BEP is committed to producing the highest quality currency. As such, the BEP has reassessed currency operations and support functions to ensure that the quality system and its components are functioning effectively. The BEP feels confident that the CQA program coupled with recent leadership changes will result in it producing a more consistent, high quality note.

### **Meaningful Access**

On May 3, 2002, a complaint was filed in the U.S. District Court for the District of Columbia against the Department of the Treasury, alleging that the currency of the United States violated Section 504 of the Rehabilitation Act because the blind and visually impaired could not

denominate it. A decision, rendered on October 3, 2008, directed that steps be taken, as may be required, to provide meaningful access to U.S. currency for blind and visually impaired persons as part of the next currency redesign.

The BEP has been actively engaged in identifying meaningful access solutions that fully comply with the Court's order, while also giving appropriate consideration to the interests of domestic and international users of currency, U.S. businesses, and cash handling and cash-intensive industries.

In January 2008, the BEP commissioned a study to assess options to enable the blind and visually impaired to better denominate U.S. currency. The study consisted of three phases:

- Phase 1: Gather data about the demographics of the visually impaired community and the usefulness of various accommodations.
- Phase 2: Review features currently available to improve access to the visually impaired via discussions with the international banknote community and experts in vision loss and tactility.
- Phase 3: Conduct a cost-benefit analysis on the alternatives identified in the first two phases. This included considering the benefits to the visually impaired and the costs to the government, industry and the general public.

Additionally, the study provided a decision model, by which the BEP could evaluate various potential accommodations. Based on the study results, the BEP drafted proposed recommendations to the Secretary of the Treasury, who by statute has the sole authority for approving U.S. currency designs. The ACD Committee, which includes leadership from the Department of the Treasury, the Board, and the USSS approved the proposed recommendations. The recommendations included pursuing development of a raised tactile feature on each note that the BEP may lawfully alter; continued use of large, high contrast numerals and background colors on each note that the BEP may lawfully alter; and a currency reader program. On May 31, 2011, the Secretary of the Treasury approved the three-pronged strategy to provide meaningful access to U.S. Federal Reserve notes for the blind and visually impaired community.

### **Meaningful Access (Currency Reader Program)**

One key part of that is to establish a nation-wide currency reader distribution program. The currency reader distribution program is designed as the one method that provides virtually all blind and visually impaired U.S. citizens and legal residents with a means to independently denominate Federal Reserve notes. The currency reader distribution program is expected to provide a useful option for the entire blind and visually impaired community for many years

because under current plans: 1) tactile-enhanced Federal Reserve notes are expected to be issued in accord with the historical practice of issuance of one denomination at a time, 2) per Congressional direction the \$1 denomination cannot be redesigned, and 3) current-design banknotes without tactile features are expected to co-circulate with tactile-enhanced banknotes for many years.

In February 2013, the BEP sought a legal opinion from the Government Accountability Office (GAO), as to whether BEP has authority to give – rather than loan – currency readers to eligible individuals under the provisions of Section 504 of the Rehabilitation Act. The BEP believed this had implications on all facets of the program, but most directly on determining the most cost-effective distribution methods. In June 2013, GAO determined that the BEP may purchase and give currency readers to blind and visually impaired individuals as part of its compliance with the Court order to provide individuals with meaningful access to U.S. currency.

To leverage existing expertise, the BEP contracted for currency reader program support from the Library of Congress National Library Services for the Blind and Physically Handicapped (LOC/NLS). The BEP based the original framework of its currency reader eligibility requirements on the LOC/NLS's Talking Books Program, where digital book readers and library materials are loaned to individuals with disabilities. Details regarding the level of support from the LOC/NLS included designing and implementing a program infrastructure that provides a database management system to process requests for currency readers and to distribute them to approved applicants.

The BEP anticipates distributing between 100,000 and 500,000 currency readers to people who are blind or visually impaired. We plan to launch a pilot program this summer and roll the program out nationally in 2015. The project plan is under joint development and will be operated by the BEP and the LOC/NLS.

### **Meaningful Access (Mobile Applications)**

Additionally, since the 2008 Court order was issued, technology has advanced dramatically. Accordingly, the BEP has provided immediate accommodation to a segment of the blind and visually impaired population by issuing a banknote denominating application (app) for mobile devices. In 2010, the BEP developed the EyeNote® app, designed to allow individuals to denominate Federal Reserve notes using a mobile device operating on the Apple iOS platform. The app is available as a free download from the Apple App Store<sup>SM</sup>, and we anticipate that it will play an increasing role in providing meaningful access to currency. The BEP also collaborated with the Department of Education to introduce a similar free app that operates on Android-based mobile devices. The IDEAL Currency Reader interacts with Google's "Eyes-

Free” application and can be downloaded from Google Play. These applications are providing an immediate accommodation for a segment of the blind and visually impaired population, and may result in lower demand for currency readers. To date, these apps have had more than 17,000 downloads.

### **Meaningful Access (Tactile Feature Technology)**

Moreover, the BEP has performed rigorous analyses on several aspects of applied tactile features. The BEP is evaluating materials and application methods for ease of application, cost, and tactility, in addition to durability in circulation. To date, the BEP has produced a set of tactile samples using four application techniques: screen printing, coating, intaglio printing, and over-coated/embossing. A BEP meaningful access tactile feature team identified the evaluation criteria to be used to rate the overall effectiveness of the samples produced using each of the four application techniques under development: durability, usability, cost, and risk. The four types of tactile feature samples were subjected to a strenuous regime of laboratory tests to evaluate their durability in terms of adhesion to the substrate, cohesion of the material itself and wear resistance. Internal teams were formed to collect and analyze data and information relevant to each of the four evaluation criteria. Based on the results of this testing, one method was eliminated from consideration. Additional testing on the three remaining application methods is required prior to making the final selection. A project team has been created to develop the necessary data and present a recommendation as to which of the three application techniques best meet the established criteria. We anticipate having the application method, which determines the equipment type required, and the application material selected by January 2015. At this point, the tactile feature will be ready for transfer to the banknote development process, which is the incorporation of features into a design concept that has been purposefully developed to accommodate all the security and functionality requirements for banknotes in the environment in which they will circulate.

Any tactile feature must, as a practical matter, be incorporated in the currency redesign process, the timing and content of which is largely driven by the level and nature of security threats to Federal Reserve notes. At the same time as the BEP is developing tactile features, it is working closely with the Board, the USSS, and the Departmental Offices of the Treasury to identify threats and determine appropriate measures to respond to them. As part of the redesign, the BEP is aggressively seeking and developing overt and covert security features, which will require a lengthy technical development process. Due to the interrelated nature of the various processes, the overall creation of any one Federal Reserve note design is a lengthy and complex endeavor, requiring appropriate progress on several fronts.

The ACD Committee has recommended that the \$10 note be the next note to be redesigned. The BEP, therefore, anticipates that the redesigned \$10 note will be the first denomination to contain

a tactile feature, an improved large, high-contrast numeral, and new security features. As a result, it is not expected that the redesigned note will be released before 2020. However, the projection of initial circulation of redesigned currency, which by court order must “take such steps as may be required to provide meaningful access to United States currency for blind and other visually impaired persons” depends on much more than just the successful design and integration of a tactile feature. The release date is also dependent on technology/security feature development, design development, and repetitive testing to ensure a smooth transition into production. As a result, no firm date for the introduction has been established. This is one of the reasons that BEP is moving forward with the currency reader program this year.

### **Future Currency Redesigns**

When deliberating the various options for the next denomination to be redesigned, the ACD Committee engaged in a detailed analysis consisting of a counterfeit threat assessment, the state of security feature development to counter such threats, production capabilities and complexities, societal issues, relative use of various notes in transactional commerce, and impact on consumers and banknote equipment manufacturers. Following its analysis, the ACD recommended the \$10 note. The \$10 note was also selected because it is a transactional note used frequently in commerce and it has a low production volume, which will allow for the smoothest transition of a new complex design to manufacturing. Once production begins, the Board, as the issuing authority, will determine when the redesigned \$10 Federal Reserve note is placed into circulation. However, should security threats against another denomination occur, the next denomination to be redesigned could change. Development of a durable, easy to use tactile feature for the blind and visually impaired is a priority for the BEP, and our most senior personnel have been tasked with this complex endeavor.

### **Conclusion**

Mr. Chairman, this concludes my remarks about initiatives at the BEP. I will be happy to respond to any questions you or other members of the Subcommittee may wish to ask. Thank you.