

	Currency Ink Production Quality Plan		Revision: #6
	Document Control Number: 93.00-3		Date: 9/29/03
Quality Plan	Responsible Organization: Office Production Support		
	Approved By: Doug Bernia		Signature: <SIGNED>

1.0 Purpose

To design, monitor, control and document the production of currency inks produced by the Bureau of Engraving and Printing to ensure that all inks provided to Bureau production areas are of sufficient quality to enable the resultant currency to achieve internal and external performance requirements.

2.0 Scope

This Quality Plan applies to all currency ink-making operations at both the Washington and Western facilities.

3.0 Responsibilities

- 3.1.1 It is the responsibility of the Managers of both BEP ink mills to maintain this Plan. This requires continual update as procedures and practices change, as well as re-issuance of the modified Plan.
- 3.1.2 It is the responsibility of the management representative responsible for the evaluation of the quality system to annually determine if this Plan meets the requirements of the BEP's quality policy.

4.0 Definitions

- 4.1 **C.O.A.:** Certificate of Analysis provided by suppliers of raw materials, which indicates that the lot of material associated with the certificate has been analyzed and found to be in compliance with specified requirements.
- 4.2 **Pre-wipe Ink:** Black currency ink that is salvaged from the pre-wipe system of the intaglio printing process.
- 4.3 **RECON:** Black currency ink that is reconstituted using the pre-wipe ink as raw material.
- 4.4 **A.C.D.:** Advanced Counterfeit Deterrence inks employing features to accomplish that end.
- 4.5 **F.O.G.:** Fineness of Grind determination of the particle size of ink components.

5.0 Design

- 5.1 All new currency inks, whether the result of currency design changes or the need to modify existing ink formulations, will be designed and tested prior to use in production in accordance with procedure # 93.00-3.4.
- 5.2 Input from production areas, as related to existing inks requiring modification, will be documented to ensure that communications pertaining to requirements are properly understood. Successful

production with re-formulated inks requires documentation from the Office of Currency Production.

- 5.3** Specific criteria related to both new inks, and modification of existing inks, will be documented. These records will be maintained in the Ink Mill Laboratory for historical purposes, and will include (in the case of modifications) each attempt to modify the formulation and the resultant data pertaining to the suitability of the modification. A reference table containing all of the procedures relevant to this Quality Plan is found in section 17.0.
- 5.4** Both Bureau ink mills will maintain multiple formulations for the production of recon ink. The selection of a given formulation is dependent upon the magnetic test results of each batch of pre-wipe ink.

6.0 Raw Materials

- 6.1** Specifications pertaining to all raw materials required for the production of currency inks will be generated to ensure that the material is suitable for its intended purpose, and for use in ensuring the consistent supply of the materials. The list of raw materials currently in use, their respective specification numbers, and the means of ensuring the quality of incoming material will be according to the following scheme:
- Visual inspection only – applies to materials considered “off the shelf” for which the BEP has had no adverse quality experiences, and entails verifying only that the material has been received from the correct supplier; is the correct part number; and is delivered in a container determined to be intact allowing for no possibility of contamination.
 - COA – applies to all critical materials, or materials with an adverse quality history, and entails verifying that the certificate documents the sufficient quality of the material.
 - BEP Inspection Procedure – applies to all critical materials requiring a specified incoming test procedure.
 - BEP procedure 93.00-3.5 contains a chart displaying each material, the level of incoming inspection, and the frequency of that inspection.
- 6.2** The suppliers of all raw materials used to manufacture currency inks will be selected according to Purchasing Procedure 93.00-1 (4.6), to ensure that all sources of such materials are able to consistently and reliably supply material in compliance with stated specifications.
- 6.3** To ensure that raw material which does not meet specified requirements is not used in the production of currency ink, all materials will be verified prior to use. Verification of the quality of incoming raw materials is dependant upon the type of material, the “quality history” of the material, and the criticality of the material. Specifics pertaining to individual materials can be found in the Specifications previously listed.

7.0 Calibration

- 7.1** All equipment used to evaluate quality related attributes of inks, or used to measure compliance to quality requirements will be controlled according to this Quality Plan. It is the responsibility of the organizational component responsible for the calibration and verification of the equipment to maintain or update their own schedule.
- 7.2** Calibration refers to the set of operations that establish under specified conditions the relationship between values indicated by a measuring instrument or measuring system, or values represented by a material measure, and the corresponding known values of a measurable quantity. Verification is conformation by examination and provision of evidence that the specified requirements have been met. Note: Where, there are no existing standards for calibrating equipment, the Washington DC Facility will develop a procedure for calibration and verify this through other components certified to be correct in function and is in direct relationship to the process to achieve the final product.
- 7.3** Calibration Method. The equipment listed on the schedule are calibrated and adjusted at prescribed intervals, or prior to use, against certified equipment having a known valid relationship to internationally or nationally recognized standards. In the event that this relationship has not been established, the basis for the calibration shall be documented. The procedure for calibrating equipment shall be available to personnel responsible for the control of the equipment.
- 7.4** Vendor Calibration. Calibration of the equipment may be performed by qualified and authorized service organizations. In some cases, the equipment may either be sent out to the service organization's facility, or a qualified representative of the service organization may perform the calibration on site. When the equipment is calibrated by a service organization, the service organization shall provide a calibration certificate and shall place a sticker on the equipment indicating the calibration status. Vendors will be required to furnish proof of current certification by a recognized authority in the field of certification. The purchaser of the services will keep copies of the vendor's certification on file.
- 7.5** BEP Calibration. For equipment calibrated by the BEP, the equipment shall be calibrated in accordance with the manufacturer's procedure or BEP –developed procedure when no vendor or manufacturer calibration procedure exists. A record of calibration shall, be maintained. BEP personnel shall identify the equipment calibration status.
- 7.6** Calibration Schedule. The following items are maintained on the schedule:
- Equipment name or type
 - Manufacturer
 - Model number and serial number (or other identification)
 - Location of the equipment

- Calibration/Verification interval
 - Last calibration date
 - Calibration due date
 - Calibration Service Provider and Phone number
- 7.6.1** All equipment designated as requiring calibration will exhibit a sticker which indicates its' current calibration status. This label, where (possible), will be affixed in a manner that provides evidence of tampering.
- 7.6.2** Non Conforming Product (finished goods). In the event that testing or measuring equipment is found to be out of calibration, mill personnel will track all lots of ink produced since the last successful calibration of the equipment, and determine which lots are currently in inventory. For any lots that have been identified as being shipped to production, the Ink Mill Manager will contact in sequence, the pressroom foreman in DCF or the Quality Manager in WCF (to notify them of the situation and to have any possibly defective ink in the section quarantined to prevent use) and the Chief, OQ to convene a corrective action team to identify any work downstream that may have been processed with the nonconforming ink, isolate and dispose it. All material, whether incoming or finished product, which is still in inventory will be re-tested with the appropriate equipment once the proper calibration has been re-established.
- 7.6.3** Upon discovery of equipment determined to be out of calibration:
- The Laboratory or Ink Mill manager will arrange for calibration services for the instrument in question.
 - The laboratory manager will re-assess the calibration interval of the equipment. This assessment will be documented.
 - The Ink Mill manager will notify the QA Lab so that work-in-process and finished work samples can be verified as being within standards.
- 7.6.4** Prior to the acquisition of new inspection measuring and test equipment, the BEP will verify that the equipment is capable of the required accuracy.
- 7.6.5** BEP ink production facilities will maintain calibration logs, in addition to equipment labeling, which documents the calibration history of each piece of equipment.
- 7.6.6** Personnel that utilize controlled equipment will ensure that environmental conditions do not adversely affect the operator of the equipment or the test results.

8.0 Document Control

The document control requirements of this Quality Plan can be found in Document and Data Control Procedure 93.00 – 1 (4.5), and pertain to the following documents:

- Material specifications
- Procedures and work instructions
- Testing procedures
- Calibration procedures
- This QAP

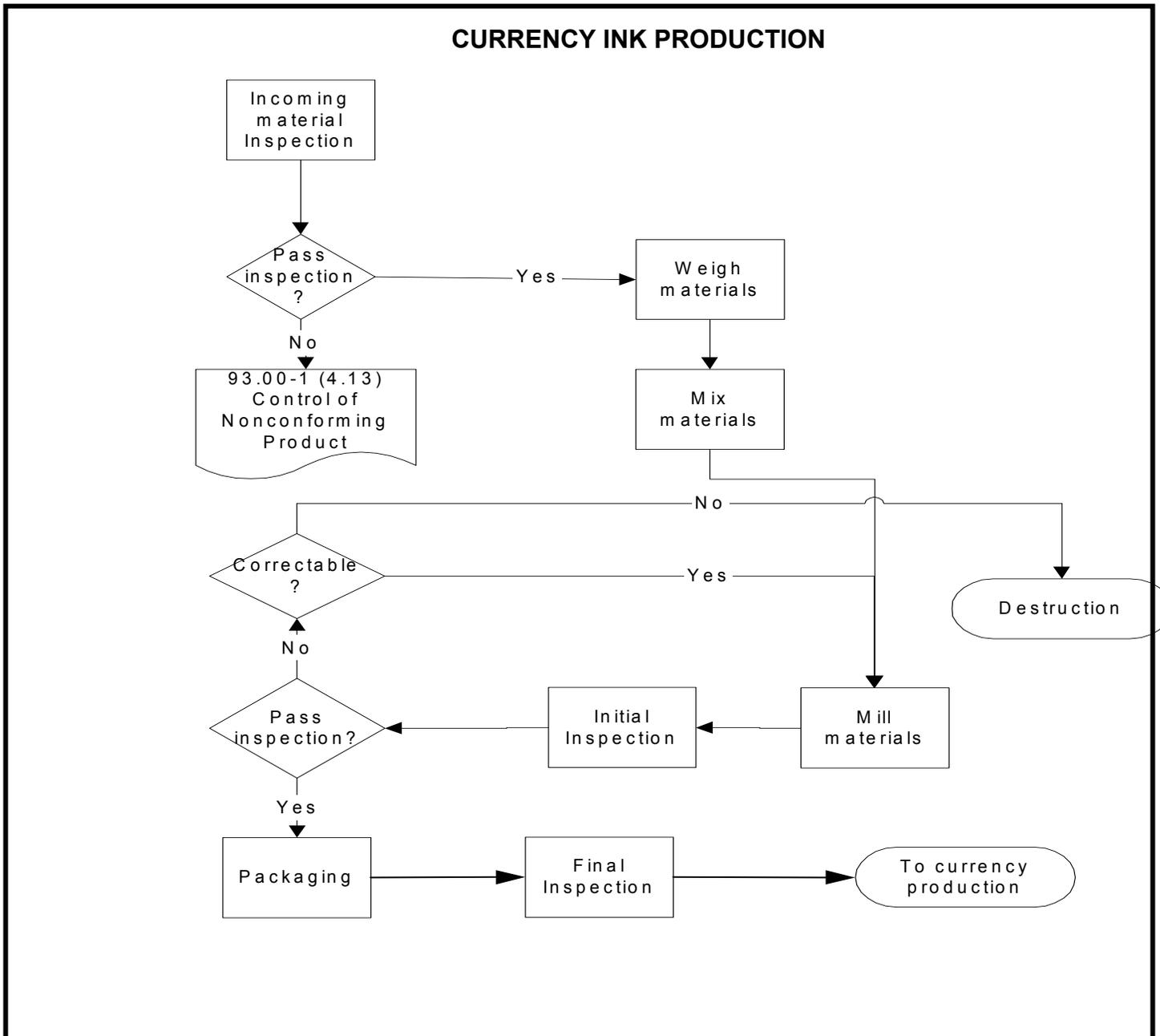
9.0 Identification and Traceability

All finished inks provided to BEP currency production areas will be identifiable and traceable according to Product Identification and Traceability Procedure 93.00 –1 (4.8). Due to current production necessities, ink will be traceable only to the Crane load.

Although not a finished ink, all pre-wipe ink used in the production of RECON currency ink will be identified according to the originating section, and the currency denomination in production when the pre-wipe was collected. For traceability purposes, this information will be incorporated into the documentation generated during the production of RECON ink.

10.0 Process Control

- 10.1** All currency ink produced by the BEP shall be produced according to this Quality Plan and the associated procedures. A flow chart describing the ink production process can be found on the following page.
- 10.2** Weighing of materials at the Washington mill will be carried out in accordance with procedure 93.00-3.9.2. Weighing of materials at the Western Facility mill will be carried out in accordance with procedure 93.00-3.9.2 FW. All materials will be weighed or measured in a manner that minimizes contamination by previously weighed material, and ensures that materials are provided in the proper proportions according to the individual formulations. The specific weights of each material vary according to the ink being prepared, and can be found in the individual ink formulations. For security reasons, access to certain formulations is restricted to individuals with a need to know, and the proper level of security clearance. Documentation pertaining to the weighing process will include the formulation, date, and identification of the individual(s) responsible for the weighing of the materials, and will accompany the materials throughout the production (ink) process.
- 10.3** Mixing of weighed materials will be accomplished in accordance with procedure 93.00-3.9.3 in the Washington mill, and 93.00-3.9.3 FW at the Western Facility mill, designed to ensure uniformity to the mixture. Mixing times may vary according to the individual ink products, and are specified in the mixing procedure.
- 10.4** Milling of mixed material will be accomplished according to procedure 93.00-3.9.4 in Washington, and 93.00-3.9.4 FW at the Western Facility, designed to ensure that the mixture does not exceed the specified particle size and is consistent throughout the mixture.
- 10.5** The preventive maintenance schedule for all production equipment appears in documents 93.00-3.9.5DC and 93.00-3.10-5FW.



11.0 Final Inspection

- 11.1 All currency inks will be tested prior to release to currency production. The following table displays tests required for each ink, the procedure utilized to confirm compliance, as well as the specific requirements (where possible).
- 11.2 Laboratory personnel associated with the respective mills will test intaglio currency inks.
- 11.3 Laboratory personnel associated with the Washington mill and ORTS will test ACD inks, and provide the test results with all ACD inks delivered to the Western Facility.

- 11.4.1** No ink rejected by customers (Plate Printing or COPE PAK) for manufacturing defects.
- 11.4.2** No rejection of notes on the BPS3000 machine due to BEP manufactured ink not meeting established quality standards.
- 11.4.3** No failure of in-process sheets or finished notes to meet or exceed durability standards due to BEP manufactured ink not meeting established standards.
- 11.4.4** No reports from our customer (The Federal Reserve) or any notes printed at the BEP using ink manufactured in-house, that were found in circulation that did not meet all established performance and quality requirements relating to ink properties.
- 11.5** All test data will be maintained according to Section 13.0 of this Plan.
- 11.6** Currency inks not meeting established criteria will be re-worked where possible. Where re-work is determined not possible, the non-compliant ink will be segregated to prevent accidental usage according to Control of Non-conforming Product Procedure 93-00-1(4.13).
- 11.7** All re-worked ink will be re-tested prior to release to insure that requirements are met.
- 11.8** Currency inks not meeting established criteria will be re-worked where possible. Where re-work is determined not possible, the non-compliant ink will be segregated to prevent accidental usage according to Control of Non-conforming Product Procedure 93.00-1 (4.13).
- 11.9** All containers of ink will be labeled as to their respective quality status. A product label will be attached to the containers after the ink passes inspection, and will exhibit the initials of the technician that conducted the testing. Containers of ink not approved for use will exhibit a yellow "Hold" label. Incoming pre-wipe ink shall be adequately segregated to prevent inadvertent usage in spite of the labeling system.
- 12.0 Corrective and Preventive Action**

Corrective and Preventive Action Procedure 93.00-1 (4.14) applies to all ink-making activity, and governs activity related to correcting quality related problems that have been identified and verified, and activity designed to prevent quality related problems before they occur. This procedure is designed to ensure that problems associated with non-compliant inks or issues threatening the quality of BEP produced inks are adequately addressed.
- 13.0 Handing, Packaging, Delivery, and Shelf Life**
 - 13.1** Currency inks will be labeled, packaged and stored according to procedure 93.00-3.12 at the Washington mill, and Western Facility mill, to ensure that only inks that meet established criteria are provided to currency production, and that printing sections are provided with only the appropriate inks.
 - 13.2** Reconstituted black intaglio ink (Bk-3795-87, Bk-3795-50, Bk-3795-59, BK-3795-100) will be provided exclusively to sections and presses printing \$1 notes.
 - 13.3** Transporting of Ink Materials or Finished Inks – Wooden or pallets are used to hold the raw materials or finished inks so that they could be transported or moved efficiently within the ink mill and to the various

currency production areas. All wooden pallets used met all construction requirements of applicable classification. All forklift truck operators are trained and licensed by BEP. Delivery and transfer schedules are used to account for transporting the finished currency inks.

13.4 For WCF Only:

After ink is lab tested and approved for release, the approved ink is picked up by the General Stores section for storage in the storeroom, or shipped directly to the Production floor by using BEPMIS to accomplish the transaction.

13.5 Shelf life – With the exception of ACD inks, all BEP manufactured inks will have a shelf life of one year from the date of manufacture when stored under ambient conditions at the BEP. The shelf life of ACD inks or ACD taggants is at least two years from the date of manufacture when stored in an air conditioned storage room in the ink mill sub-basement. All the remaining inventories of BEP manufactured inks or ACD taggants with expired shelf life will be subjected to a quality control re-screening to determine its condition for production use.

14 Control of Quality Records

Quality records generated in accordance with this Quality Plan will be controlled according to Control of Quality Records Procedure 93.00-1 (4.16). This includes purchasing documents, incoming inspection results, orders to manufacture, finished product inspection, calibration logs, equipment maintenance, audit reports, corrective and preventive actions, and shipment records. Retention times and disposition information can be found in the referenced procedure. Specific quality records associated with the production of currency inks are listed at the back of this procedure.

15.0 Quality Audits

Internal quality audits will be carried out under Internal Quality Audit Procedure 93.00-1 (4.17). For security reasons, audit teams responsible for conducting audits of ink-making activities will contain at least one member with a security clearance sufficient to allow access to security documents and processes. The results of the audits, any corrective action required, and follow-up audit activity will be documented according to the above procedure. The management of the respective ink mills will maintain records of these activities, in addition to the records maintained by auditing personnel.

16.0 Training

Training of ink mill personnel will be in accordance with Training Procedure 93.00-1 (4.18). Documentation will be maintained for all training of personnel involved with both ink making and inspection activities.

17.0 References:

Procedure/Record	Washington	Fort Worth
Ink Design	93.00-3.4	93.00-3.4
Purchasing	93.00-1 (4.6)	93.00-1 (4.6)
Incoming Material Inspection	93.00-3.5	93.00-3.5
Document Control	93.00-1 (4.5)	93.00-1 (4.5)
Identification and Traceability	93.00-1 (4.8)	93.00-1 (4.8)
Prewipe Pump Operation	93.00-3.9.1 DC	93.00-3.9.1 FW
Weighing Procedure	93.00-3.9.2DC	93.00-3.9.2 FW
Mixing Procedure	93.00-3.9.3DC	93.00-3.9.3 FW
Milling Procedure	93.00-3.9.4DC	93.00-3.9.4 FW
Fineness of Grind	STM 321.005-02	STM 321.005-02
Drying Time	STM 321.001.02a	STM 321.001.02a
Viscosity and Yield Values	STM 321.015.02a	STM 321.015.02a
Magnetics	STM 321.101.02	STM 321.101.02
Spectra	STM 320.011.01a	NA
Color	STM 321.006.02a	STM 321.006.02a
Laundry Test (High Level Inks)	STM 200.006.02	NA
Tack	ASTM D4361-97	ASTM D4361-97
Corrective and Preventive Action	93.00-1 (4.14)	93.00-1 (4.14)
Handling Packaging and Delivery	93.00-3.12	93.00-3.12
Control of Quality Records	93.00-1 (4.16)	93.00-1 (4.16)
Quality Audits	93.00-1 (4.17)	93.00-1 (4.17)
Training	93.00-1 (4.18)	93.00-1 (4.18)

REVISION	PURPOSE OF REVISION	EFFECTIVE DATE
1	Chgs to Sections 4.0 Definitions, 7.0 Table, 11.0 Table, 17.0 References	5/28/02
2	Chgs to Sections 7.0 Calibrations, 10.0 Process Control, 11.0 Table, 13.0 Handling, Packaging, Delivery and Shelf Life, 17.0 Reference Table.	8/27/02
3	To change procedure references in sections 10.2, 10.3, 10.4	10/28/02
4	Insertion of Section 11.4 Quality Objectives	1/13/03
5	Chgs to Sections 5.0 Design, 7.0 Calibration, 11.0 Table, 11.4 Quality Objectives, Insertion of 11.8	3/20/03
6	Add formula to WCF ink production list (sec. 11.3); change to sec. 17.0	9/29/03