Latent Print Analysis Technical Procedures Manual

Escondido Police Department
Forensic Services Unit

Contents

1. INTRODUCTION: OVERVIEW, SCOPE, & PURPOSE

The services offered in latent print analysis include, but are not limited to, the analysis of latent prints, comparison of latent prints and known prints, and automated searches. Latent print analysis services are also provided for some outside agencies which require assistance. Expert testimony in court is provided in casework.

The methods outlined in this manual are guidelines for the examination of friction ridge skin in this Forensic Services Unit. They are not comprehensive instructions for all types of examinations; situations may arise that are not covered in this manual. Personnel shall always use their best judgment in examination of latent print evidence.

Friction ridge examination is the examination of all types of friction ridge skin (latent prints, patent prints from unknown sources, and known print exemplars) using the ACE-V methodology.

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2. METHOD OF FRICTION RIDGE EXAMINATIONS

ACE-V Methodology

Suitability

The determination of suitability is based on the assessment of the discriminating strengths of the features and their arrangements. Suitability is the determination that there is adequate quality and quantity of friction ridge features in an impression for some further process step. The assessment is made based on the quality of features (clarity of the observed features), the quantity of features (amount of features and area), the specificity of features, and their relationships.

Some factors to consider that may influence quality include, but are not limited to, residue / matrix, deposition pressure, surface / substrate, the environment, development medium, preservation method and condition of the friction skin.

1. Visually examine the evidence.

   All areas of the evidence will be examined. If there are sufficient characteristics to perform a comparison, the latent print impression will be marked using the following guidelines:

   a. An ink pen will be used to mark the impression to be examined.

   b. Each impression will be assigned a "Q" number identifier. Example: "Q1", "Q2"

   c. When known, a line will be drawn at the bottom of each latent print impression to show orientation.

2. *Analysis* is the examination of a friction ridge impression, considering the quality and quantity of observable detail, and the assessment of its suitability for comparison or automated search.

      a. Level 1 detail – First level detail includes the general overall direction of ridge flow in the print. First level detail is not limited to a defined pattern classification. Every impression that is determined to be a friction ridge print has a general direction of ridge flow. Impressions of fingers, phalanges, tips, sides, palms, or soles have first level detail.

      b. Level 2 detail – Second level detail is the path of a specific ridge. The actual ridge path includes the starting position of the ridge, the path the ridge takes, the length of the ridge path, and where the ridge path stops. Second level detail is much more than a specific location of where a ridge terminates at a ridge ending or bifurcation, or its Galton points. Sequences and configurations with other ridge paths are part of second level detail. The

sequences and configurations of a series of ridge paths are also unique. Second level details cannot exist without first level details. The general direction of ridge flow must exist for a specific ridge path to exist.

c. Level 3 detail – Third level details are the shapes of the ridge structures. This level of detail encompasses the morphology (edges, textures, and pore position) of the ridge. The features of third level details are unique in their shapes, sequences, and configurations. Clarity of the print might limit an examiner's ability to perceive the morphology, sequences, and configurations of third level detail. Third level detail cannot exist without first and second levels of detail.

d. Anatomical source (finger, palm, foot, toe).

3. Visually examine the known exemplars.

   If the area necessary for comparison is not available in the known exemplar, obtain additional exemplars from the subject or by accessing the county or state finger or palm print archive systems.

4. *Comparison* is the direct or side-by-side observation of friction ridge detail in two impressions to determine whether they are in agreement/disagreement, based on similarities/dissimilarities, sequence and spatial relationship. Consultation and blind testing are recommended for use in complex comparisons and at the discretion of the Specialist.

5. *Evaluation* is the formulation of a conclusion. The evaluation is based upon the significance of agreement or disagreement between ridge data.

   Appropriate Friction Ridge Examination Source Conclusions:

   Source Conclusions: This establishes the conclusions an examiner may reach when comparing two friction ridge impressions. In reaching a conclusion, an examiner considers the observed similarities and dissimilarities and assesses the relative support of the observations under the following two propositions: the two impressions originated from the same source or from different sources. Similarities generally provide support for the proposition that two impressions originated from the same source, while dissimilarities generally provide support for the proposition that two impressions originated from different sources. An examiner may utilize their knowledge, training, and experience as well as statistical or probabilistic systems to evaluate how much support the observed similarities or dissimilarities provide for one proposition over another. A conclusion shall not be communicated as a fact. It is an interpretation of observations made by the examiner and shall be expressed as an expert opinion.

A. Source Exclusion: Is the conclusion that two friction ridge impressions did not originate from the same source. Source Exclusion is reached when in the examiner's opinion, considering the observed data, the probability that the two impressions came from the same source is considered negligible.

B. Support for Different Sources: Is the conclusion that the observations provided more support for the proposition that the impressions originated from different sources rather than the same source; however, there is insufficient support for a Source Exclusion. The degree of support may range from limited to strong or similar descriptors of the degree of support. Any use of this conclusion shall include a statement of the degree of support and the factor(s) limiting a stronger conclusion.

C. Inconclusive or Lacking Support: Is the conclusion that the observations do not provide a sufficient degree of support for one proposition over the other. Any use of this conclusion shall include a statement of the factor(s) limiting a stronger conclusion. The following are options for justification for inconclusive:

- Due to the insufficient quantity and quality of the known prints.
- Due to the insufficient quantity and quality of the latent print.
- After exhaustive search, unable to locate the area of friction ridge detail.

D. Support for Same Source: Is the conclusion that the observations provide more support for the proposition that the impressions originated from the same source rather than different sources; however, there is insufficient support for a Source Identification. The degree of support may range from limited to strong or similar descriptors of the degree of support. Any use of this conclusion shall include a statement of the degree of support and the factor(s) limiting a stronger conclusion.

E. Source Identification: Is the strongest degree of association between two friction ridge impressions. It is the conclusion that the observations provide extremely strong support for the proposition that the impressions originated from the same source and extremely weak support for the proposition that the impressions originated from different sources. Source Identification is reached when the friction ridge impressions have corresponding ridge detail and the examiner would not expect to see the same arrangement of details repeated in an impression that came from a different source.

Qualifications and Limitations: 1) An examiner shall not assert that a source identification is the conclusion that two impressions were made by the same source or imply an individualization to the exclusion of all other sources. **2)** An examiner shall not suggest that the offered conclusion is an expression of absolute certainty. **3)** An examiner shall not assert or imply that latent print examination is

infallible or has a zero error rate. **4)** An examiner shall not cite the number of latent print comparisons performed in his or her career as a measure for the accuracy of a conclusion offered in the case at hand. **5)** An examiner shall not use the expression 'reasonable degree of scientific certainty' or similar assertions as a description of the confidence held in his or her conclusion.

F. Preliminary Association - This conclusion is used only as a result of a Preliminary AFIS Association and reported as an investigative lead only.

A Preliminary Association is the result of searching an image of a latent print impression in AFIS and the conclusion is reached, based on comparing the returned candidate records onscreen, that the two friction ridge impressions have corresponding characteristics contained within that are sufficient to conclude they MAY have originated from the same source.

Official identifications are NEVER reported from Preliminary AFIS Association results alone.

6. *Verification* is the independent and impartial review of a friction ridge examination by another competent specialist. A second specialist performs an independent analysis (A), comparison (C), and evaluation (E) between the impression and exemplar(s). The verifier will come to their own independent conclusion and then review the original specialist's conclusion. If the conclusions are in agreement, the verifier will sign the report. If there is a disagreement, see section 8 of this manual on conflict resolution.

   All comparisons are verified. Any other cases may be verified at the discretion of the specialist.

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3. AUTOMATED FINGERPRINT IDENTIFICATION SYSTEM (AFIS)

The Automated Fingerprint Identification System (AFIS) is used to perform latent and known print searches from various databases containing finger and palm prints.

The AFIS is comprised of computer workstations in which prints are entered, searched and enrolled. The workstations are password protected and only accessible by personnel assigned to the unit by management. The workstations are on a secure dedicated Cal-ID network which protects the images from loss or contamination.

See the user's guides for details on entering prints into the system.

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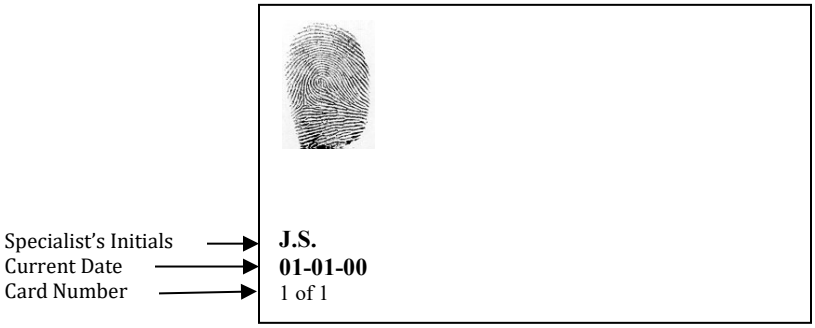
4. DOCUMENTATION OF CASES

Regardless of the determination of value or no value, all cases need to be documented according to the following guidelines:

- Initials of the specialist and current date are placed on the front of every lift card, photograph, or item of evidence (such as a pawn slip) using permanent ink, at the time packaging is opened for commencement of examination. Exception: If the print is on the back of an item of evidence, initials and date will then go on the back. For example; a lift card (no prints on the front of the card), initials and date will go on the back of the lift card. If the lift cards are scanned into the case management software prior to examination by a Specialist, typed text labeled on the card may be used to demonstrate the markings in the software. All of the pertinent information shall be entered into the case management software. This information can be used in lieu of marking the card in the software. The original evidence shall still contain the original markings of the specialist.

- All evidence shall be numbered 1 of x, 2 of x, etc., on the front of the item of evidence or where the print is located. If the lift cards are scanned into the case management software prior to examination by a Specialist, typed text labeled on the card may be used to demonstrate the markings in the software. All of the pertinent information shall be entered into the case management software. This information can be used in lieu of marking the card in the software. The original evidence shall still contain the original markings of the specialist. If the lifting official has already numbered the evidence, further numbering is not necessary.

Documentation Example



- The specialist's notes shall include a detailed inventory which contains the location of where the prints were taken, if provided by the lifting person. All available information shall be documented in the case management software. An Inventory Form may be utilized in addition to putting information into the case management software.

- Contact sheets shall be made for images containing prints from QueTel and/or media received. Images that do not refer to or contain prints do not need contact sheets. Images pertinent to the case shall be uploaded to the case management software.

- If a contact sheet is printed, each image on the contact sheet shall be numbered consecutively. The image barcode number from QueTel may be used for numbering purposes.

- All friction ridge skin cases will be entered into the case management software.

4.1. DOCUMENTATION OF NO VALUE/COMPARISON ONLY PRINTS/AFIS QUALITY PRINTS

If the specialist determines the prints are of no value or the prints are of value for comparison only (with no subjects to compare) or AFIS entry, the following guidelines shall be used:

- For prints that are deemed of no value, "NV" shall be used to identified them. If the entire latent lift card, image or item of evidence is deemed of no value, "NV" will be placed on the card/image/item. A Q number designator is not necessary but may be used at the specialist's discretion.

- For prints that are deemed of comparison only, "CP" shall be used to identify them. A Q number designator is not necessary but may be used at the specialist's discretion.

- For prints that are deemed of quality for AFIS entry, "CI" shall be used to identify them. A Q number designator is not necessary but may be used at the specialist's discretion.

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5. AFIS CASES

- Each print searched in AFIS shall be labeled with a “Q” number identifier. All items (lift card, photocopy, image, etc.) of evidence shall start with the letter "Q" and proceed in numerical order throughout the entire case.

- Each print image on the contact sheet searched in AFIS shall be labeled with the “Q” number identifier (there can be multiple prints in an image).

- Prints that are entered into AFIS shall be marked with an orientation line by underlining the bottom of the palm print or an arc above a fingerprint, or the phalange will be marked with lines on both sides of the area.

- Entry of prints into other accessible databases is done at the discretion of the specialist or at the direction of the investigator.

- A minimum of twenty candidates are reviewed per latent print entry or until an AFIS candidate develops. The candidate list may be included in the specialist’s case notes.

- If an AFIS candidate develops, a printout of the unknown and known print from the automated search shall be included in the specialist’s case notes.

- If an AFIS candidate develops, the case then becomes a comparison case.

- If no candidate develops the case is complete. Registration of the latent print is done at the discretion of the specialist or at the request of the investigator.

- Legible copies or photographs of the print(s) searched in AFIS shall be added to case notes for completion. Each photocopied item shall have all markings on the evidence item visible. Scanning at a high quality in to the case management software can replace making legible copies or photographs.

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5.1. AFIS REGISTRATIONS

The unsolved print database contains prints that have previously been entered in the system with negative results.

Entry of a print into the unsolved print databases is at the discretion of the examiner.

If a possible hit is generated from the candidate list, the case becomes a comparison case. The candidate list then shall be scanned into the case management software and becomes part of the case notes.

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6. COMPARISONS

All comparisons and subsequent AFIS entry is at the discretion of the specialist, the assigned investigator or the deputy district attorney.

In comparisons cases, latent prints are compared to the known prints of an individual(s) in the following manner:

- At a minimum, the prints are compared to the known prints until one identification to each individual is made. At that point, the case can be completed and turned over to another specialist for verification.

- In most cases, only one identification is necessary. Additional latent prints may be identified at the discretion of the primary specialist, or at the request of the assigned investigator or deputy district attorney.

- If an exclusion was made, AFIS quality prints may be searched in the automated system.

- If known prints are not on file for the subject to be compared and the prints are of value for AFIS entry, the technician may perform an automated search on those prints.

- If all subject(s) compared in the case were excluded and the prints are of value for AFIS entry, the specialist's may perform an automated search on those prints.

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6.1. DOCUMENTATION OF COMPARISON CASES

- Initials of primary technician and current date shall be placed on the front of every item of evidence using permanent ink at the time packaging is opened for commencement of examination. Exception: If the print is on the back of an item of evidence, initials and date will then go on the back. For example; a lift card (no prints on the front of the card), initials and date will go on the back of the lift card.
  Note: This step is not required for cases being conducted by the originating specialist.

- The primary specialist's notes shall have a detailed inventory which includes the location of where prints were taken. **Note:** This step would have already been completed for cases originating as AFIS entries. The primary specialist may utilize the inventory form completed by another specialist.

- Highlight all prints to be compared by arcing a line above a finger, parallel lines around a phalange or underlining a palm of the print (if orientation is known). If not already done, place a Q number designator next to each highlighted print(s) that was compared.
    - If the case originated from an AFIS search, prints will already be underlined and highlighted with a letter designator.

- Legible copies or photographs of the print(s) compared and searched in AFIS shall be added to cases notes for completion. Scanning at a high resolution and entering into the case management system can replace legible copies or photographs.

- High resolution scans of known prints used for the comparison shall be added to case notes in the case management software.

- If an identification is made, the "Q" number shall be followed by the corresponding finger/palm area, the full last and first name of the identified individual and the date of birth. The primary specialist's initials and date of identification will follow the subject information. The CII number of the subject may also be written on the evidence. *Ex: Q1=LT(#6) of Rojas, Jane DOB 12/21/1911 LSM #1451 03/13/2018*. Exception to this will be on evidence, such as ninhydrin, where there is no area to mark on the evidence without writing over ridge detail. The documentation can be placed on the closest proximal packaging, such as a clear check cover or Kpak.

Comparison Example:

Q1=LT(#6) of Rojas, Jane DOB 12/21/1911 LSM #1451 03/13/2018

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7. VERIFICATION

The verification of print casework also serves as the technical review of an examination. The independent application of the ACE process as utilized by a subsequent technician to either support or refute the conclusions of the original technician; this may be conducted as a blind verification.

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7.1. BLIND VERIFICATIONS

General Comments:

Applications for Blind Verification

A blind verification is an independent examination of one or more friction ridge impressions where the verifying technician shall not consult with the primary technician, and shall not be aware of the conclusion reached by the primary technician. An exception to consulting with the verifying technician is when there is a noticeable clerical error after verification.

A blind verification can be performed at any phase of the ACE-V process.

Implementation of the blind verification process includes:

7.1.1. Procedure for the Primary Technician:

Follow the documentation of evidence from the appropriate section. This includes the documentation and completion of the applicable stages of ACE (analysis, comparison and evaluation) in case notes with a conclusion(s). The note pages shall not be transferred to the blind verifier until after the completion of the verification process.

With comparison cases, all known exemplars shall be transferred to the verifier, even if the final conclusion is of no value.

Transfer only the evidence item(s) and known exemplars to the verifying technician.

In instances where the evidence is a digital image and a print(s) is compared, the contact sheet of the images shall also be transferred to the verifier that includes the underline/arch and letter of the individual print(s) examined.

7.1.2. Procedure for the Verifying Technician:

Utilize an Internal Transfer Form for evidence transferred between examiners during the blind verification process.

Follow the documentation of evidence from the appropriate section. This includes the documentation and completion of the applicable stages of ACE (analysis, comparison and evaluation) in case notes with a conclusion(s)

Once the verification is complete, transfer back the evidence item(s), known prints (if applicable) and completed note page(s) with documented conclusion(s) to the primary technician.

7.1.3. Procedure for Primary Technician after Verification:

After verification and upon receiving the evidence item(s), known exemplars and verifying technician's note page(s), the primary technician shall review the verifying technician's documentation for similarities/differences with his/her conclusion(s).

If the conclusion(s) is the same, then the primary technician completes their case note packet and report and forwards it to the verifying technician for a technical review.

If the conclusion(s) is different, then the primary technician notifies the technical lead/supervisor. The case shall be resolved by using conflict resolution. See Conflict Resolution Section 8 of this manual.

Blind verification will be used in the following situations:

- Strong contextual influence.
- Complex examination (e.g. the existence of high distortion, low number of features, features with low quality, or features that are not discriminative, especially for low-quality AFIS searches resulting in individualizations).
- Conflicts among examiners.

It is suggested that blind verification be used on the following situations:

- Large disparity in the examiner and the verifier's levels of experience.
- A print recovered from a highly probative location (e.g. on the trigger of the murder weapon).
- A single print generating a conclusion (individualization, exclusion, or inconclusive) to an individual in a case.
- Uncertainty in the decision of the anatomical origin (e.g. finger, palm, or toe) of the print.
- Other circumstances at the discretion of the specialist.

8. CONFLICT RESOLUTION

General Comments:

A conflict occurs when there is a difference of conclusions between two specialists that becomes apparent after a regular verification, or after a blind verification.

Procedure:

1. When examiners have differences of opinions on a case, the following steps will be taken to try to resolve the conflict. This does not include potential erroneous individualizations which should be directed to the Unit Supervisor or Technical Leader.
2. Consultation between the examiners will be conducted to discuss the basis for their differences in opinion. If the matter can be resolved, no further review is necessary. Documentation of this consultation, including the different opinions and their basis, as well as the resolution reached, must be added to case file.
3. If the initial and verifying examiner cannot resolve the conflict this will be reported to the Unit Supervisor or Technical Leader to determine what action will follow, this may include:
   A. Case may be referred back to initial and verifying examiner for additional consultation.
   B. A third examiner may conduct an independent review and provide documented justification of their conclusions.
   C. Blind testing by additional examiners with documented justification of their conclusions.
   D. An external agency review may be conducted. External review requires approval of the Unit Supervisor or Laboratory Director.
4. If an issue is unable to be resolved, the more conservative conclusions will be reported out with an explanation of the differing opinions (after appropriate review).
5. All documentation resulting from conflict resolution must be kept in the case file.
6. Reference material may be asked for to support each examiner's conclusion.

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9. MAJOR CASE PRINTS

Major case prints are collected from both living and deceased individuals. There are different preservation methods available for the collection of major case prints. Some of these methods include powdering and inking. Major case prints may also include the recording of the plantar (feet) areas upon request.

When major case prints are requested for hands or feet, collection/recording of the available friction ridge skin shall be obtained.

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9.1. *DOCUMENTATION OF MAJOR CASE PRINTS*

The following shall be documented on the back of each page of collected major case prints (MCPs):

- Technician's name
- Date the prints were collected
- Case number (if applicable)
- Name and DOB of the individual whose MCPs were collected (printed legibly on at least on page)
- Signature/initials (if available) of the individual being printed

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9.2. ENHANCEMENT TECHNIQUES FOR DECEASED INDIVIDUALS

Refer to the Latent Print Development Technical Procedures Manual for details.

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10. REPORTS

One type of report shall be written for no value cases, comparison only cases with no subject(s) to compare, and automated search negative result reports.

One other type of report shall be written for comparison cases with subject(s) that were compared.

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10.1. TECHNICAL REVIEW

All examinations and automated searches shall have a technical review and a verification.

Technical and administrative reviews are performed on all casework before a final report is released unless it is the release of preliminary results. See Section 10.3 of this manual.

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10.2. ADMINISTRATIVE REVIEW

All reports will be administratively reviewed, and shall follow the guidelines of Section 5.2.2 the laboratory's Quality Assurance Manual regarding Case Record Review.

10.3. RELEASE OF PRELIMINARY RESULTS

A preliminary result is defined as either 1) a conclusion released prior to verification or 2) a conclusion released after verification but before the laboratory report has been issued.

Investigative Lead Reports

- Investigative Lead Reports have been designed and implemented in an effort to provide the submitter with preliminary investigative leads in a timely and efficient manner. The customer evaluates the Preliminary AFIS Association contained within the report and determines if the association would provide additional merit to his/her investigation. If deemed important to the customer, the customer can request a full confirmatory examination, where all suitable latent prints undergo a full comparison and verification to confirm either identification, inconclusive, or exclusion.
- It is recognized that performing on-screen comparisons utilizing AFIS search software does not offer the examiner the full capacity to declare an official

identification has been effected. Potential loss of quality due to compression of the image(s), monitor resolutions, capture resolutions, limited enhancement tools, etc. are all possible utilizing various AFIS software comparison tools.

- As a presumptive examination, it is also recognized that due to these factors stated above, although rare, false positive AFIS Associations may be discovered upon performing an official confirmatory examination with the original latent images and record finger and/or palm prints.
- When an examiner determines that a preliminary AFIS association has been effected, a second examiner will verify the association. Under general conditions, the association and verification is made utilizing the available information contained within the image of the latent searched and the record finger image displayed. For complex or severely degraded or fragmented latent prints, examiners have the discretion to obtain clear record finger and/or palm prints from the database.
- A screen shot, either printed or in digital format, will have the original examiner's initials and date and the verifying examiner's initials and date written on the screen shot. This will be included in the case documentation. It will be reported to the customer that a preliminary AFIS association has been established with a listing of the preliminary associated individual's identifying information. The report will clearly state that an official identification has not been effected at this time. A separate request can be made by the customer if a confirmatory examination needs to be conducted with the original latent(s) and record finger and/or palm prints.

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11. QUALITY ASSURANCE & QUALITY CONTROL

Quality assurance/quality control can be defined as those activities that ensure that the work product meets a standard of quality that minimizes the potential for errors in casework. The following are some activities that should be used as guidelines in our quality program:

- Refer to the laboratory Quality Assurance Manual for general QA procedures.
- Specialists shall complete a training program as described in the section Training Technical Procedures Manual.
- All verifications include the process of technical review as per Section 10 of this manual.
- AFIS searches with negative results, and cases that are useable for comparison only (with no subjects to compare) are technically reviewed and verified.
- All reports are reviewed for administrative content. The administrative reviewer signs the administrative review line of the report.

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12. GLOSSARY

Refer to the Quality Assurance Manual for a glossary of terms.

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13. ABBREVIATIONS

Refer to the Quality Assurance Manual for approved abbreviations.

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14. EQUIPMENT

Refer to the Quality Assurance Manual for approved equipment.

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15. REFERENCES

Refer to the Quality Assurance Manual for references.

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16. MANUAL REVISIONS

Refer to the QA11 Document Control for revision information.

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