PROCEDURE NO.  NDT-PQ-100

TITLE:
WRITTEN PRACTICE FOR THE QUALIFICATION AND CERTIFICATION OF NDT PERSONNEL

Rev. 0: 3/5/08

Prepared By:  [Signature]
ASNT Professional NDT Level III
Certificate No. 9295

Approved By:  [Signature]
Jefferson Lab
1.0 SCOPE

1.1 This procedure, prepared in accordance with the guidelines of SNT-TC-1A, 2006 Edition, is for the qualification and certification of Jefferson Lab Nondestructive Testing (NDT) personnel.

1.2 Jefferson Lab recognizes that the guidelines specified in the SNT-TC-1A, 2006 Edition, do not meet all applicable requirements for its particular inspection criteria. Subsequently, in developing a written practice as required by section 5, SNT-TC-1A, 2006 Edition, Jefferson Lab has modified them, as necessary, to meet its own specific needs using the intent of ISO 20807, “Qualification of personnel for Limited Applications of Non-destructive Testing”

1.3 This document provides the requirements for the establishment of a qualification and certification program. It is intended to fully meet or exceed the intent of ASNT SNT-TC-1A, 2006 Edition.

2.0 DEFINITIONS

2.1 Terms included in this document are defined as follows;

2.1.1 **Employer:** The corporate or private entity which employs personnel for wages, salary, fees, or other considerations.

2.1.2 **Certification:** Written testimony of qualification.

2.1.3 **Examiner B:** Equivalent certification level to an NDT Level I.

2.1.4 **Examiner A:** Equivalent certification level to an NDT Level II.

2.1.5 **Experience:** Work activities accomplished in a specific inspection method under the direction of a qualified supervisor, including performing the inspections and examinations and all related activities, but not including time spent in organized training programs.

2.1.6 **Nondestructive Testing:** A process that involves the inspection, testing, or evaluation of materials, components and assemblies for material’s discontinuities and properties without further impairing or destroying the parts serviceability.

2.1.7 **Qualification:** Possessing sufficient skill and knowledge, including the required training and experience, for personnel to adequately perform the duties in a specific NDT method.

2.1.8 **Quality Assurance:** Personnel responsible for assuring that requirements are met and the procedures are followed. QA personnel provide audits and inspections of projects, and audits of management programs.
2.1.9 **Quality Control:** Personnel responsible for the examination and acceptance of processes at the time completed.

2.1.10 **Training:** The organized program developed to impart the knowledge and skills necessary for qualification.

2.1.11 **Certifying Agency:** Jefferson Lab shall be the certifying agency.

2.1.12 **Corporate level III:** Individual appointed by Jefferson Lab to administer the NDT certification program.

2.1.13 **Outside Agency:** A company or individual who provides NDT Level III services and whose qualifications to provide these services have been reviewed and approved by Jefferson Lab.

2.1.14 **Written Practice:** A written procedure developed by the employer that details the requirements for qualification and certification of their employees.

3.0 **NONDESTRUCTIVE TESTING METHODS**

3.1 Qualification and certification of inspection personnel in accordance with this written practice is applicable to the following method:

3.1.1 Visual Testing – VT

3.1.2 If other methods, techniques or limited applications are needed, they shall be added by revision to this written practice.

4.0 **LEVELS OF QUALIFICATION**

4.1 There are three basic levels of qualification. These levels can be further subdivided by Jefferson Lab for specific situations where limited levels of skill and responsibility are deemed appropriate. If subdivided, the specific training, experience, and limitations will be specified in 6.3.

4.2 While in the process of being trained, qualified, and certified to Examiner B, an individual shall be considered a Trainee. A Trainee shall work with a certified examiner ‘A’ and shall not independently perform any inspections or interpret, evaluate and report the results.

4.3 The three basic levels of qualification are as follows;

4.3.1 **Examiner B (Equivalent to an NDT Level I).** An Examiner B shall be qualified to perform specific test and specific evaluations for for acceptance or rejection determinations according to
written instructions and to record results. An Examiner B shall receive the necessary instruction and supervision from an Examiner A or an NDT Level III.

4.3.1 **Examiner A (Equivalent to an NDT Level II).** An Examiner A shall be qualified to set up and verify settings and perform the tests in accordance with written instructions. He shall also be qualified to record, classify, interpret and evaluate the test results in accordance with documented criteria. The Examiner A shall be thoroughly familiar with the scope and limitations of the methods for which he is qualified and shall assist in the training and guidance of Trainees. The Examiner A shall be able to organize and report test results.

4.3.2 **NDT Level III.** An NDT Level III individual shall be capable of developing, qualifying, and approving written instructions and procedures, establishing and approving techniques, interpreting codes, standards, specifications and procedures; and designating the particular techniques, written instructions, and procedures to be used. The NDT Level III shall be responsible for the NDT operations for which qualified and assigned and shall be capable of interpreting and evaluating results in terms of existing codes, standards and specifications. The NDT Level III shall have sufficient practical background in applicable materials, fabrication and product technology to establish techniques and to assist in establishing acceptance criteria when none are otherwise available. The NDT Level III shall have general familiarity with other appropriate NDT methods, as demonstrated by an ASNT Level III Basic examination or other means. The NDT Level III, in the methods in which certified, shall be capable of training and examining NDT personnel for certification in those methods.

5.0 **JEFFERSON LAB’S WRITTEN PRACTICE**

5.1 This written practice describes the responsibility of each level of certification for determining the acceptability of materials or components in accordance with the applicable codes, standards, specifications, and procedure. It details the training, experience and examination required for certification.

5.2 This written practice shall be either developed by, or reviewed and approved by, the Jefferson Lab NDT Level III.

5.3 This written practice shall be maintained on file.

6.0 **QUALIFICATION REQUIREMENTS**

6.1 Personnel considered for certification in NDT shall have sufficient education, training, and experience to ensure qualification in those NDT methods in which they are being considered for certification. Documentation of prior certification may be used by Jefferson Lab as evidence of qualification for comparable levels of certification.
6.2 Documented training and/or experience equivalent to those of a Level I, II, and/or III prior to establishment of Jefferson Lab’s written practice may be considered in satisfying the criteria of Section 6.3.

6.3 To be considered for certification, a candidate shall satisfy one of the following criteria for the applicable NDT level:

6.3.1 **Examiner A and Examiner B:**

6.3.1.1 Table 6.3.1 in appendix ‘A’ lists the required training and experience factors to be considered when establishing initial qualification for certification of Examiner A and B personnel.

6.3.2 **NDT Level III:**

6.3.2.1 Have graduated from a minimum four year college or university curriculum with a degree in engineering or science, plus one year of experience beyond the Examiner A requirements in NDT in an assignment comparable to that of an Examiner A in the applicable NDT method(s), or;

6.3.2.2 Have completed, with passing grades, at least two years of engineering or science study at a university, college, or technical school, plus two additional years of experience beyond the Examiner A requirements in NDT in an assignment at least comparable to that of Examiner A in the applicable NDT method(s), or;

6.3.2.3 Have four years' experience beyond the Examiner A requirements in NDT in an assignment at least comparable to that of an Examiner A in the applicable NDT method(s).

7.0 **TRAINING PROGRAMS**

7.1 Personnel being considered for initial certification shall complete sufficient organized training to become thoroughly familiar with the principles and practices of the specified NDT inspection method related to the level of certification desired and applicable to the processes to be used and products to be tested.

7.2 The training program shall include sufficient examinations to assure understanding of the necessary information.

7.3 Training courses shall include all applicable items detailed in Appendix B

7.4 If outside training services are purchased, Jefferson Lab is responsible for ensuring that such services meet the requirements of this document.
8.0 EXAMINATIONS

8.1 An NDT Level III individual or a designated representative shall administer and grade the examinations specified in Sections 8.2 through 8.8.

8.2 **Vision Examinations** (to be conducted by NDT Level III or medically trained persons)

8.2.1 **Near-Vision Acuity:** The examination shall assure natural or corrected near distance acuity in at least one eye, such that the applicant is capable of reading a minimum of Jaeger number one (1) or equivalent type and size letter at a distance of not less than 12 inches (30.5 cm) on a standard Jaeger test chart. The ability to perceive an Ortho-Rater minimum of 8 or similar test pattern is also acceptable. This shall be administered annually.

8.2.2 **Color Contrast Differentiation:** The examination should demonstrate the capability of distinguishing and differentiating contrast among colors used in the method. Successfully completion of test plates, such as Pseudo Isochromatic Plates, is also acceptable. This shall be conducted upon initial certification and at five-year intervals thereafter.

8.3 **General** (Written for Examiner B and A)

8.3.1 The general examinations shall address the basic principles of the applicable method.

8.3.2 In preparing the examinations, the corporate NDT Level III shall select or devise appropriate questions covering the applicable method to the degree required by Jefferson Lab.

8.3.3 The minimum number of questions which shall be given is shown in Table 1.

<table>
<thead>
<tr>
<th>Test Method</th>
<th>Examiner B</th>
<th>Examiner A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Testing</td>
<td>40</td>
<td>40</td>
</tr>
</tbody>
</table>

8.4 **Specific** (Written for Examiner B and A)

8.4.1 The specific examination shall address the equipment, operating procedures, and NDT techniques that the individual may encounter during inspections to the degree required by Jefferson Lab, as determined by the Corporate NDT Level III.

8.4.2 The specific examination should also cover the specifications or codes and acceptance criteria used in Jefferson Lab’s inspection procedures.
8.4.3 The minimum number of questions which shall be given is shown in Table 2.

<table>
<thead>
<tr>
<th>Test Method</th>
<th>Examiner B</th>
<th>Examiner A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visual Testing</td>
<td>20</td>
<td>20</td>
</tr>
</tbody>
</table>

8.5 **Practical** (for Examiner B and A)

8.5.1 The candidate should demonstrate familiarity with and ability to operate the necessary equipment, record, and analyze the results to the degree required.

8.5.2 At least one selected specimen should be tested and the results of the inspection analyzed by the candidate.

8.5.3 The description of the specimen, the inspection procedure, including check points and the results of the examination, shall be documented.

8.6 **Examiner B and A Practical Exam**

8.6.1 Proficiency shall be demonstrated in performing the applicable inspection method and interpreting and evaluating the results on one or more samples approved by the NDT Level III. At least ten (10) different checkpoints requiring an understanding of inspection variables and Jefferson Lab's procedural requirements shall be included in this practical examination.

8.7 The general and specific examinations shall be administered without access to reference material (closed book) except that necessary data, such as graphs, tables, specifications, procedures, codes, etc., may be provided. All questions used for Examiner B and A examinations shall be approved by the responsible NDT Level III.

8.8 **NDT Level III Examinations**

8.8.1 Basic examination (required only once when more than one method examination is taken). The number of questions which shall be given is as follows:

8.8.1.1 Fifteen (15) questions relating to understanding the SNT-TC-1A document.

8.8.1.2 Twenty (20) questions relating to applicable materials, fabrication, and product technology.
8.8.1.3 Twenty (20) questions that are similar to published Level II questions for other appropriate NDT methods.

8.8.2 Method Examination (for each method).

8.8.2.1 Thirty (30) questions relating to fundamentals and principles that are similar to published ASNT Level III questions for each method.

8.8.2.2 Fifteen (15) questions relating to application and establishment of techniques and procedures that are similar to the published ASNT Level III questions for each method.

8.8.2.3 Twenty (20) questions relating to capability for interpreting codes, standards, and specifications relating to the method.

8.8.3 Specific Examination (each method).

8.8.3.1 Twenty (20) questions relating to specifications, equipment, techniques, and procedures applicable to Jefferson Lab's NDT methods and to the administration of this written practice.

8.8.4 Practical Examination (each method)

8.8.4.1 When the candidate's duties include NDT examinations for customer acceptance, proficiency in set-up, detection, evaluation and proper documentation of discontinuity evaluations in one or more test samples shall be demonstrated. At least ten (10) different checkpoints requiring an understanding of inspection variables and Jefferson Lab's procedural requirements shall be included in this practical examination.

8.8.5 A valid endorsement on an ASNT NDT Level III certificate, or on a generally recognized and accepted third party certification for NDT Level III, such as ASNT ACCP certification, fulfills the examination criteria described in 8.9.1 and 8.9.2 for each applicable inspection method.

8.8.6 Jefferson Lab may delete the specific examination described in 8.9.3 if the candidate has a valid ASNT NDT Level III certificate or a generally recognized and accepted third party certification for NDT Level III, in the method and if documented evidence of experience exists, including the preparation of inspection procedures to codes, standards, or specifications and the evaluation of test results.

8.8.7 Jefferson Lab may delete the specific examination described in 8.4 for Examiner A and 8.8.3 for NDT Level III and give credit for the practical examination described in 8.6 for Examiner A and 8.8.4 for NDT Level III if the candidate has a generally recognized and accepted third party certification for NDT Level II or NDT Level III, such as ASNT ACCP certification, which includes procedure preparation and general hands on practical examinations.
8.9 Grading

8.9.1 An NDT Level III shall be responsible for the administration and grading of examinations for NDT Level I, II, or other Level III personnel. The administration and/or grading of examinations may be delegated to a designated representative of the Corporate NDT Level III and so recorded. The designated representative shall be an employee of Jefferson Lab.

8.9.2 For Examiner B and Examiner A, a composite grade shall be determined by simple averaging of the general, specific, and practical examination results. For Level III personnel, the composite grade shall be determined by simple averaging of the basic, method, and specific examination results.

8.9.3 Examinations administered for qualification shall result in a composite grade of at least 80 percent, with no individual examination having a grade less than 70 percent.

8.9.4 When an examination is administered and graded for the employer by an outside agency and the outside agency issues grades of pass or fail only, on a certified report, then the employer may accept the pass grade as 80 percent for that particular examination.

8.9.5 Those failing to attain the required grades shall wait at least thirty (30) days or receive suitable additional training as determined by the NDT Level III before reexamination.

8.9.6 If Jefferson Lab purchases outside services it is responsible for ensuring that the examination services meet the requirements of this written practice.

9.0 CERTIFICATION

9.1 Certification for all levels of NDT personnel is the responsibility of Jefferson Lab.

9.2 Certification of NDT personnel shall be based on satisfactory demonstration of qualification in accordance with Sections 6, 7, and 8, of this written practice.

9.3 At the option of Jefferson Lab, an outside agency may be engaged to provide NDT Level III services. In such instances, the responsibility of certification is retained by Jefferson Lab.

9.4 When Jefferson Lab purchases outside services, Jefferson Lab is responsible for assuring that the training and examination services are in accordance with this written practice.

9.5 Personnel certification records shall be maintained on file by Jefferson Lab for at least two (2) years after expiration of the certification. The length of retention may be longer if customer requirements so specify.
9.5.1 The qualification records of the certified individuals shall include the following:

9.5.1.1 Name of certified individual.

9.5.1.2 Level of certification and inspection method.

9.5.1.3 Educational background and experience of certified individuals.

9.5.1.4 Statement indicating satisfactory completion of training in accordance with this written practice.

9.5.1.5 Results of the vision examinations prescribed in 8.2 for the current certification period.

9.5.1.6 Current examination copy(ies) or evidence of successful completion of examinations.

9.5.1.7 Other suitable evidence of satisfactory qualifications when such qualifications are used in lieu of examinations.

9.5.1.8 Composite grade(s) or suitable evidence of grades.

9.5.1.9 Signature of the NDT Level III that verified qualifications of candidate for certification.

9.5.1.10 Dates of certification and/or recertification and the dates of assignment to NDT.

9.5.1.11 Certification expiration date.

9.5.1.12 Signature of Jefferson Lab’s certifying authority.

10.0 TECHNICAL PERFORMANCE EVALUATION

10.1 NDT personnel may be reexamined any time at the discretion of Jefferson Labs QA/QC Dept and have their certificates extended or revoked.

10.2 The technical performance of an Examiner B or Examiner A shall be evaluated and documented by an NDT Level III at intervals that do not exceed five (5) years. The evaluation and documentation shall follow the format and guidelines described in paragraph 8.6.

11.0 INTERRUPTED SERVICE
11.1 Interrupted service is an absence or change of activity which prevents the certified individual from practicing the duties corresponding to their level in the NDT method for a continuous period in excess of one (1) year.

11.2 Reexamination for the interrupted service shall be in those portions of Section 8.0 deemed necessary by the Corporate NDT Level III and recertification shall be based on successful completion of the applicable portions of the specified examination.

12.0 RECERTIFICATION

12.1 An Examiner B or Examiner A shall be recertified in accordance with evidence of continuing satisfactory technical performance, as defined in paragraph 10.2. Other examinations described in Section 8.0 may be required, as deemed necessary by the Corporate NDT Level III.

12.2 Level III personnel shall be recertified in accordance with Section 8.0, Examinations.

12.3 Maximum recertification intervals are:

12.3.1 Examiner B, Examiner A, NDT Level III - 5 years

13.0 TERMINATION

13.1 Jefferson Lab's certification of an individual shall be deemed revoked when employment is terminated.

13.2 An Examiner B, Examiner A, or Level III whose certification has been terminated by another employer may be certified to the former NDT level by Jefferson Lab based on examination, as described in Section 8.0, provided all of the following conditions are met to Jefferson Lab's satisfaction:

13.2.1 The employee has proof of prior certification.

13.2.2 The employee was working in the capacity to which certified within six (6) months of termination.

13.2.3 The employee is being recertified within six (6) months of termination.

13.2.4 Prior to being examined for certification, employees not meeting the above requirements shall receive additional training as deemed appropriate by the Corporate NDT Level III.

14.0 REINSTATEMENT
14.1 An Examiner B, Examiner A, or Level III whose certification has been terminated may be reinstated to the former NDT Level, without a new examination, provided all of the following conditions are met:

14.1.1 Jefferson Lab has maintained the personnel certification records required in Paragraph 9.5.

14.1.2 The employee’s certification did not expire during termination.

14.1.3 The employee is being reinstated within six (6) months of termination.
Appendix A

TABLE 6.3.1

Required Training and Experience for Initial Certification

<table>
<thead>
<tr>
<th>Examination Method</th>
<th>Visual Testing (VT)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Examiner B</td>
</tr>
<tr>
<td>Level</td>
<td></td>
</tr>
<tr>
<td>Initial Training(^1,^3) (Hours)</td>
<td>4</td>
</tr>
<tr>
<td>Experience per Level(^2,^3) (Hours)</td>
<td>140</td>
</tr>
</tbody>
</table>

1 = High School Graduate or Equivalent

2 = Work time experience shall be documented and shall be the time spent in VT and NDT related activities

3 = For Examiner A certification, the experience shall consist of time at Examiner B, or equivalent. If a person is being qualified directly to Examiner A with no time at Examiner B, the required experience shall consist of the sum of the times required for Examiner B and Examiner A and the required training shall consist of the sum of the hours required for Examiner B and Examiner A.
APPENDIX B

TRAINING OUTLINE
VISUAL TESTING

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  1.2 NDT Testing Classifications
  1.3 Visual Testing Definition
  1.4 Overview of Visual Testing
  1.5 Nondestructive Test Flowchart

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    3.6.2 Surface Conditions
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      3.6.2.2 Color
      3.6.2.3 Texture
    3.6.3 Physical Conditions
      3.6.3.1 Specimen Condition
      3.6.3.2 Shape
      3.6.3.3 Size
      3.6.3.4 Temperature
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6.0 Visual Inspection of Specific Code Chapters
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