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**NONDESTRUCTIVE EVALUATION  
RADIATION APPLICATIONS GROUP**

**Quality Procedure**

**PERSONNEL QUALIFICATION AND CERTIFICATION  
RADIOGRAPHIC TESTING - LEVELS I & II**

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**MMED**

**MANUFACTURING AND MATERIALS ENGINEERING DIVISION**

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**PERSONNEL QUALIFICATION AND CERTIFICATION**  
**RADIOGRAPHIC TESTING - LEVELS I & II**

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## 1.0 SCOPE

- 1.1 This Operational Procedure establishes the minimum requirements for the qualification and certification/recertification of Nondestructive Evaluation (NDE) personnel in the nondestructive testing (NDT) radiographic testing (RT) method. This document is in accordance with the American Society for Nondestructive Testing Recommended Practice SNT-TC-1A, 1996, except as amended herein.
- 1.2 Satisfactory completion of the requirements described herein shall qualify NDE personnel as a certified NDT Level I or Level II in the radiographic testing method. Training and examination for certification shall be performed by an NDT Level III or a recognized and approved ASNT Level III outside agency.
- 1.3 These requirements apply to LLNL NDE personnel at Livermore, Site 300, Nevada Test Site or other field locations.

## 2.0 VISION REQUIREMENTS

- 2.1 Vision requirements shall be in accordance with Paragraph 8.2 of SNT-TC-1A, 1996.
- 2.2 The visual examination shall be administered by the NDT Level III, NDE management, or qualified medical personnel.

## 3.0 LEVELS OF QUALIFICATION

### 3.1 General

3.1.1 There shall be three basic levels of qualification: NDT Levels I, II and III. This document addresses those requirements necessary for Levels I and II. Level III certification shall be through the American Society for Nondestructive Testing.

3.2.1 In the process of being qualified to NDT Level I, an individual shall be considered a Trainee. A Trainee shall work only under the direct supervision of a certified Level II or III, and shall not independently conduct any test, interpret results of any test, or issue a report of test results.

### 3.2 Level I

3.2.1 An NDT Level I shall be qualified to properly perform specific RT calibrations, tests and evaluations while under the guidance or supervision of a certified Level II or III. A Level I shall be qualified to operate all x-ray machines with energies up to and including 450 kV.

- 3.2.3 A Level I individual shall not operate the linear accelerator x-ray machines or use radioisotopes for radiography except under the direct supervision of a certified Level II or III.

### 3.3 Level II

- 3.3.1 An NDT Level II individual shall be qualified to setup, calibrate, and operate all x-and gamma radiation equipment; interpret and evaluate test results with respect to applicable design documents (codes, standards and specification), and have a working knowledge of laboratory, local, state and federal regulations regarding the use of radioisotopes (Ir-192 and Co-60) for field radiography.
- 3.2.2 An NDT Level II shall exercise assigned responsibility for on-the-job training of trainees and NDT Level I individuals. An NDT Level II shall be able to prepare written instructions, to organize NDT investigations and to assist LLNL engineers in the preparation of NDT reports.

## 4.0 EDUCATION AND EXPERIENCE

### 4.1 General Requirements

- 4.1.1 Individuals considered for certification in radiographic testing shall have sufficient education, and experience to ensure understanding of the principles and procedures of radiographic testing.
- 4.1.2 An NDT Level III shall review a candidate's resume and determine the suitability of the candidate's qualifications (education, NDT experience and training). Inquiries may be made directly to the candidate or to others familiar with the candidate's qualifications.

### 4.2 Specific Requirements

- 4.2.1 Candidates for Level I and II certification shall have the recommended minimum work experience in accordance with Section 6 of the American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A, 1996.
- 4.2.2 Credit for experience gained in previous employment may be permitted at the discretion of NDE management with concurrence of the Level III examiner.

## 5.0 TRAINING

## 5.1 General Requirements

- 5.1.1 A Candidate considered for qualification and certification shall receive sufficient training to satisfy the NDT Level III examiner that the candidates is familiar with the principles and practices of radiography related to the level of certification desired and applicable to the practices to be used and the products to be tested.
- 5.1.2 The training program shall include sufficient examination to ensure the training material has been comprehended.
- 5.1.3 References to be used as sources of information for the NDT Radiographer training program shall include, but are not limited to, the following:
1. "ASNT Level II Study Guide - Radiographic Testing Method", published by the American Society for Nondestructive Testing.
  2. "ASNT Level III Study Guide - Radiographic Testing Method", American Society for Nondestructive Testing.
  3. "Nondestructive Testing Handbook", Third Edition, Volume 4, Radiographic Testing, American Society for Nondestructive Testing.
  4. "Recommended Practice No. SNT-TC-1A," 1996 edition, American Society for Nondestructive Testing.
  5. "Radiography in Modern Industry", Eastman Kodak Company.
  6. "Industrial Radiography Manual", No. OE-84036, United States government.
  7. "Nondestructive Evaluation Theory, Techniques, and Applications," edited by Peter J. Shull, Marcel Dekker, Inc., New York, 2002.
  8. "Nondestructive Testing," William J. McGonnagle, Gordon and Breach Science Publishers, New York, 1975
  9. "Annual Book of ASTM Standards", Section 3 Metals Test Methods and Analytic Procedures, Vol. 03.03 Nondestructive Testing, ASTM International, latest revision.
  10. "Facility Safety Plan Building 327 General Operations", FSP-327, Lawrence Livermore National Laboratory, latest revision.
  11. "Facility Safety Plan Building 239 General Operations", FSP-239, Lawrence Livermore National Laboratory, latest revision.

12. "Facility Safety Plan Chemistry and Material Science Site 300 Facility", FSP-S300.8, Lawrence Livermore National Laboratory, latest revision.
13. Code of Federal Regulations, Title 10, Part 20, "Standards for Protection Against Radiation", and Part 34, "Licenses for Radiography and Radiation Safety Requirements for Radiographic Operations".
14. California Administrative Code, Title 17, Health, Chapter 5, "California Radiation Control Regulations".
15. State of Nevada, "Rules and Regulations for Radiation Control, Radioactive Materials".

## 5.2 Specific Requirements

- 5.2.1 Candidates for initial Level I and Level II certification shall receive the recommended minimum training by an NDT Level II or III Radiographer in accordance with the American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A, 1996, Section 6.
- 5.2.2 If a candidate is being qualified directly to Level II with no time as a Level I, the total training hours required for Level I and Level II shall apply.

## 5.3 Safety Training Requirements

- 5.3.1 All NDT Level I and Level II candidates shall receive the safety training specified in Facilities Safety Procedures FSP-239, FSP-327 and FSP-S300.8 as well as on-the-job training.

## 5.4 Waiver of Requirement

- 5.4.1 Part or all of the requirements in 5.2.1 and 5.2.2 may be waived by NDE management with concurrence of the Level III examiner if the candidate demonstrates by oral examination that, through independent study and/or previous experience, he/she has a thorough working knowledge of the radiographic method.
- 5.4.2 In special cases, it may be desirable to qualify and certify an individual to perform only a specific examination for a specific application. In such cases, a waiver of some or all of the requirements in 4.2 and 5.2 may be authorized by NDE management with concurrence of the Level III examiner.

## 6.0 EXAMINATIONS

### 6.1 General Requirements

- 6.1.1 Each candidate shall be given a three-part examination covering the general, specific, and practical aspects of radiography.
- 6.1.2 The general exam may be administered by an qualified independent outside organization.
- 6.1.3 The method of grading the examinations shall conform to the requirements of the American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A, 1996, Section 8.

## 6.2 Specific Requirements

- 6.2.1 The general written examination for Levels I and II shall each conform to the requirements of the American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A, 1996, Section 8.
- 6.2.2 The specific written examination for Levels I and II shall each consist of a minimum of forty (40) questions approved by NDE management. The questions shall cover the specific equipment to be operated, operating procedures, test techniques, and laboratory and field safety requirements. A period of two (2) hours without access to reference material (closed book test) shall be allotted to complete the examination.

note: Data, such as graphs, charts, and tables required to take the examination, will be provided.

- 6.2.3 The practical examination shall consist of the candidate demonstrating to the NDT Level III examiner proficiency in the operation of equipment, performance of radiography tests, and evaluation of results which are applicable to the level of certification being sought. The examination shall include at least 10 different checkpoints requiring an understanding of test principles and variables and laboratory, operational requirements.
- 6.2.4 Candidates who fail the examination must either wait at least thirty (30) days or show evidence of having studied or reviewed the training material to the satisfaction of the Level III examiner prior to re-examination.

## 7.0 CERTIFICATION

### 7.1 General Requirements

- 7.1.1 Certification of NDT personnel shall be based on demonstration of satisfactory qualification in accordance with Sections 6, 7, and 8, of American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A, 1996, as modified herein.

7.1.2 For candidates that successfully qualify, a copy of the qualification record, vision test record and certification statement shall be maintained in the NDE office. In addition, copies of the qualification and certification records of the NDT Level III who certified the Level II personnel shall be maintained in the NDE office.

7.1.3 An individual's certification may be restricted to the performance of a specific examination.

7.1.4 An individual's Level I or Level II certification is valid only for a period of three years.

## 7.2 Recertification

7.2.1 Level I and Level II personnel shall be recertified by one of the following criteria: (a) evidence of continuing performance; or (b) reexamination in those portions of the examinations deemed necessary by an NDT Level III, in accordance with requirements of the American Society for Nondestructive Testing Recommended Practice No. SNT-TC-1A, 1996, Section 9.5, "Recertification."

7.2.2 The recertification interval of Level I and Level II personnel shall be at least once every three years.

7.2.3 A new recertification form shall be placed in the applicable files, as stated in paragraph 7.1.1, to reflect each individual's current status after recertification.

7.2.4 Level III personnel are recertified through the American Society for Nondestructive Testing at least every five years in accordance with requirements of the ASNT Recommended Practice No. SNT-TC-1A.

## 7.3 Termination

All NDT Level I and Level II certifications shall be automatically terminated when an employee leaves the administrative jurisdiction of NDE.

8.0 RECORDS

- 8.1 NDE management shall maintain a file for each certified individual in conformance with SNT-TC-1A, 1996, paragraph 9.4.
- 8.2 The certification file shall include the following completed and signed documents (Attachments 1 through 5):
  - 8.2.1 NDE Education and Training Resume, LL 4993
  - 8.2.2 NDE Experience Resume, LL 4994
  - 8.2.3 NDE Section Personnel Qualification Record, LL 4995
  - 8.2.4 NDE Certification Statement, LL 4996
  - 8.2.5 NDE Vision Test Record, LL 4997