**Date:** **NVLAP Lab Code:** Click or tap here to enter text.

**NIST Handbook 150-4 Checklist**

**Ionizing Radiation Dosimetry Testing Program**

**Instructions to the Assessor:** This checklist addresses specific accreditation requirements prescribed in the NIST Handbook 150-4, *Ionizing Radiation Dosimetry*, in addition to those set forth in the *NVLAP General Criteria Checklist* (ISO/IEC 17025:2017).

Place an "X" beside each checklist item that represents a nonconformity. Place a "C" beside each item on which you are commenting for other reasons. Record the item number and written nonconformity explanation and/or comment on the comment sheet(s) at the end of the checklist. Write "OK" beside all other items you observed or verified as compliant at the laboratory.

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| **Requirement** | **Compliance****(OK, X, or C)** | **Management System Reference** | **Objective Evidence** |

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| **1** | **General information** |
| **1.3** | **Program description** |

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|  | **1.3.3** | Processors who provide dosimetry services to internal clients (i.e., dosimeters are issued to workers under the same organization, such as a utility company with a dosimetry processing division) shall ensure that the laboratory's scope of accreditation is appropriate to meet state and federal requirements for the worker who was issued a dosimeter. | Choose an item. |       |       |
|  | **1.3.4** | Processors who provide dosimetry services to external clients shall clearly communicate to the client the scope of the processor's accreditation, including radiation categories for each type and model of dosimeter provided. | Choose an item. |       |       |
|  | **1.3.5** | NVLAP does not prohibit a processor from providing additional services outside the scope of its accreditation, but those services shall be clearly identified in client reports as not being in the scope of the laboratory's NVLAP accreditation. | Choose an item. |       |       |
|  | **1.3.6** | Processors may utilize dosimeters and processing techniques of their choice. However, once accredited, the dosimeters and processing techniques used to provide accredited dosimetry in the normal conduct of work shall be the same as those that were used in demonstrating proficiency. | Choose an item. |       |       |
|  | **1.3.7** | The processor shall notify the NVLAP Program Manager of any changes or deviations from the specified dosimeters or processing techniques and provide evidence of satisfactory proficiency testing for those dosimeters or processing techniques before the new dosimeters and techniques can become a part of the processor's scope of accreditation. | Choose an item. |       |       |

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| **3** | **Accreditation process** |
| **3.3** | **On-site assessment** |

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|  | **3.3.3** | The processor shall have its facilities and equipment in good working order and be ready for examination according to the requirements identified in this handbook, ISO/IEC 17025, NIST Handbook 150, and the laboratory’s management system documentation. | Choose an item. |       |       |
|  | **3.3.6** |  |  |  |  |
|  | **c)** | Processor staff shall be available to answer questions; however, the NVLAP assessor may wish to review the documents and records in private. | Choose an item. |       |       |
|  | **e)** | All equipment required to process ionizing radiation dosimeters shall be available for examination. | Choose an item. |       |       |
|  | **3.3.8** | The processor shall review all comments for potential improvements in the dosimetry measurement system. | Choose an item. |       |       |

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| **3.4** | **Proficiency testing** |

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|  | **3.4.1.1** | Each processor shall demonstrate satisfactory performance in accordance with ANSI/HPS N13.11, *Personnel Dosimetry Performance – Criteria for Testing*, and ANSI/HPS N13.32, *Performance Testing of Extremity Dosimeters*, for each dosimeter model it intends to use and in each test category for which accreditation is desired. Satisfactory proficiency-test results shall be demonstrated prior to initial accreditation and every two years thereafter | Choose an item. |       |       |

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|  | **3.4.1.2** | The proficiency-test review during the on-site assessment includes: |

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|  | **a)** | The processor shall demonstrate to the satisfaction of a NVLAP assessor that normal day-to-day processing is done in a manner consistent with that employed in the proficiency test. | Choose an item. |       |       |
|  | **b)** | If, for technical reasons, the processor needs to void a reported result in the proficiency test, all the corresponding objective evidence shall be documented and reviewed by the NVLAP assessor during the on-site assessment. | Choose an item. |       |       |
|  | **3.4.1.5** | A summary of the procedure for participation in the proficiency test follows: |  |  |  |
|  | **a)** | The processor shall submit a total of 15 dosimeters of each model to be used in each category in which testing is desired.  The dosimeters shall be submitted to the PTL in three separate groups of five each, one month apart. Each shipment will also require, for each model being tested, at least one shipping control and six extra dosimeters to be used as spares.  The first shipment shall include two additional dosimeters of each model to be used for photos (dosimeters may have to be destroyed). All dosimeters will be returned when the test is complete. | Choose an item. |       |       |
|  | **d)** | The processor shall read each dosimeter and determine a dose for each category. | Choose an item. |       |       |
|  | **e)** | The processor shall report the determined doses to the PTL within 30 days of receipt of each dosimeter set. The final report of determined doses, including any changes to previously reported data, shall be provided to the PTL within 30 days of receipt of the third set of dosimeters. | Choose an item. |       |       |

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|  | **3.4.2** | **Analyzing and reporting proficiency data** |

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|  | **3.4.2.1** | Reporting and analyzing the proficiency data includes: |  |  |  |
|  | **b)** | If, for technical reasons, the processor needs to void a reported result in the proficiency test, all the corresponding objective evidence shall be documented and submitted to the PTL prior to the completion of a testing quarter. | Choose an item. |       |       |
|  | **3.4.2.3** | The processor shall review the proficiency testing data for potential improvements in the dosimetry measurement system. | Choose an item. |       |       |
|  | **3.4.3** | **Proficiency test nonconformities** |  |  |  |
|  | **3.4.3.1** | If a processor fails to demonstrate satisfactory performance for whole body dosimetry processing during a proficiency test, the processor shall submit additional whole-body dosimeters for a retest at the next available round of proficiency testing. | Choose an item. |       |       |

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| **6** | **Resource requirements** |

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|  | **6.2** | **Personnel** |

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|  | **6.2.1** | The processor shall document the required qualifications for each staff position. The staff information may be kept in the official personnel folders or in separate, official folders that contain only the information that the NVLAP assessor need to review. | Choose an item. |       |       |
|  | **6.2.2** | The processor shall maintain a list of personnel designated to fulfill NVLAP requirements including: Laboratory Director, NVLAP Authorized Representative, and NVLAP Approved Signatories. | Choose an item. |       |       |
|  | **6.2.3** | At least one of the personnel dosimetry Approved Signatories shall be experienced in applied radiation dosimetry and knowledgeable in the design and operation of the dosimetry system(s) currently utilized. | Choose an item. |       |       |
|  | **6.2.4** | The training program shall be updated when procedures change. | Choose an item. |       |       |
|  | **6.2.5** | Staff members shall be retrained when procedures change, or when the individuals are assigned new responsibilities. Each staff member may receive training for assigned duties either through on-the-job training, formal classroom study, attendance at conferences, or another appropriate mechanism. | Choose an item. |       |       |
|  | **6.2.6** | When key personnel are added to the staff, the notification of changes to NVLAP shall include a current resume for each new staff member. | Choose an item. |       |       |
|  | **6.2.7** | For each staff member, the staff member’s immediate supervisor, or a designee appointed by the Laboratory Director, shall conduct annually an assessment and an observation of performance. | Choose an item. |       |       |
|  | **6.2.8** | Individuals hired to perform testing activities are sometimes referred to as “subcontractors.” NVLAP does not make a distinction between full-time laboratory employees and individuals hired on a contract. NVLAP requires that the dosimetry laboratory maintain responsibility for and control of any work performed within its scope of accreditation. The processor shall ensure all individuals performing dosimetry processing activities satisfy all NVLAP requirements, irrespective of the means by which individuals are compensated (e.g., the processor must ensure all test personnel receive proper training and are subject to annual performance reviews, etc.). | Choose an item. |       |       |
|  | **6.2.9** | Training materials that are maintained within the processor shall be kept up-to-date. | Choose an item. |       |       |
|  | **6.4** | **Equipment** |  |  |  |
|  | **6.4.1** | The processor shall have adequate facilities and equipment to perform the type(s) of processing for which capability is claimed. Adequate facilities and equipment shall include the following: |  |  |  |
|  | **a)** | sufficient space to perform the processing; | Choose an item. |       |       |
|  | **b)** | proper shielding of areas from unwanted radiation; | Choose an item. |       |       |
|  | **c)** | necessary environmental controls; | Choose an item. |       |       |
|  | **d)** | radiation sources and processing equipment; | Choose an item. |       |       |
|  | **e)** | safety systems; and | Choose an item. |       |       |
|  | **f)** | properly calibrated equipment. | Choose an item. |       |       |
|  | **6.4.2** | When a new dosimeter or system is to replace another, all new items shall be tested and assessed prior to retiring the old items from service. Depending on the timing, this may require that both systems, the old and the new, undergo proficiency testing so that the processor maintains accreditation. | Choose an item. |       |       |
|  | **6.4.3** | The processor shall maintain adequate backup equipment or systems for key processing steps to be used in the event of failure of primary systems or shall have provisions to utilize the services of another NVLAP-accredited processor in an emergency. | Choose an item. |       |       |
|  | **6.4.4** | The processor shall notify NVLAP headquarters if the processor wishes to change its processing system (e.g., upgrade present system, entirely replace with a new system, or add a new system in addition to the current system). NVLAP management will advise the processor of the required proficiency testing and if an on-site assessment is necessary. | Choose an item. |       |       |
|  | **6.4.5** | Any equipment used for measurement, dosimeter processing, or quality control shall be periodically calibrated or documented as to indicate the lack of need for periodic calibration. | Choose an item. |       |       |
|  | **6.4.6** | The reference standards used and the environmental conditions at the time of calibration shall be documented for all calibrations. | Choose an item. |       |       |
|  | **6.4.7** | Calibration records and evidence of the traceability of the reference standards used shall be made available for inspection during the on-site assessment. | Choose an item. |       |       |
|  | **6.4.8** | In addition to the information specified in ISO/IEC 17025, processing equipment calibration records shall include the following: |  |  |  |
|  | **a)** | notation of all equipment variables requiring calibration or verification; | Choose an item. |       |       |
|  | **b)** | range of calibration/verification; | Choose an item. |       |       |
|  | **c)** | resolution of the instrument and its allowable error; | Choose an item. |       |       |
|  | **d)** | calibration/verification date and schedule; | Choose an item. |       |       |
|  | **e)** | identity of the laboratory individual or external service responsible for calibration; and | Choose an item. |       |       |
|  | **f)** | source of reference standard and traceability. | Choose an item. |       |       |

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|  | **6.6** | **Externally provided products and services** |

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|  | **6.6.1** | The processor shall test, in accordance with standard sampling procedures, incoming supplies that affect the accuracy of the processing service. For example, the sampling of incoming supplies would include testing film and characterizing new TLD chips before initial use. | Choose an item. |       |       |
|  | **6.6.2** | The processor shall use only appropriate, characterized, tested materials, including the following: |  |  |  |
|  | **a)** | dosimeter materials; | Choose an item. |       |       |
|  | **b)** | badge holders; | Choose an item. |       |       |
|  | **c)** | filters; | Choose an item. |       |       |
|  | **d)** | chemicals; and | Choose an item. |       |       |
|  | **e)** | validated software. | Choose an item. |       |       |
| **7** | **Process requirements** |

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|  | **7.2** | **Selection, verification and validation of methods** |

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|  | **7.2.1.1** | The processor shall develop and implement procedures covering all the technical requirements of this handbook. | Choose an item. |       |       |
|  | **7.2.1.2** | The most recent editions of the documents listed in 1.4 shall be available as references in maintaining the management system. | Choose an item. |       |       |

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|  | **7.4** | **Handling of test or calibration items** |

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|  |  | Received dosimeters shall be surveyed for radioactive contamination prior to processing. | Choose an item. |       |       |
|  | **7.5** | **Technical records** |  |  |  |
|  | **7.5.1** | Records shall be maintained for at least three years. | Choose an item. |       |       |
|  | **7.5.2** | Records shall be reviewed by the NVLAP assessor during the on-site assessment either in total or by selected sampling. | Choose an item. |       |       |

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|  | **7.6** | **Evaluation of measurement uncertainty** |

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|  |  | The processor shall develop measurement uncertainty analyses for all dosimeters and radiation types for which it is accredited. | Choose an item. |       |       |
|  | **7.7** | **Ensuring the validity of results** |  |  |  |
|  | **7.7.1** | ANSI/HPS N13.11 and ANSI/HPS N13.32 require that the PTL make the test irradiations on a specified phantom. However, the standard does not specify that a processor use such a phantom when making calibration irradiations. If the processor does not use a phantom, suitable factors shall be applied to convert from free-air calibration to on-phantom calibration. | Choose an item. |       |       |
|  | **7.7.2** | The PTL will provide each participating processor with emission rate, spectrum, and backscatter information on the neutron source used, and calibration irradiation of a set of the processor's neutron dosimeters, which shall be used for ANSI/HPS N13.11 neutron/photon mixtures category. | Choose an item. |       |       |
|  | **7.7.3** | Data from monitoring activities includes: |  |  |  |
|  | **a)** | The processor shall have procedures for software verification and validation, including process control software (dosimeter handling and identification), dose algorithms, data processing (data analysis and reporting), and record keeping. The IEEE Standard 1012-1998, *IEEE Standard for Software Verification and Validation Assurance Plans* shall be used as a reference. In addition, software version control shall be included in the laboratory document control procedures for all software. | Choose an item. |       |       |
|  | **b)** | The proficiency tests are performed under controlled conditions and may not precisely reflect the radiation exposure monitored in the field. Algorithms used by a processor to pass proficiency testing may need to have special factors for specific radiation applications. However, the use of special workplace factors shall be done with great care, and the use of algorithms specifically tailored to the proficiency tests is discouraged unless they are shown to be adequate for the radiation fields monitored by the laboratory. The dose algorithm used for proficiency testing shall be as similar as possible to the one used during normal operations. | Choose an item. |       |       |
|  | **c)** | Calibration/correction factors used in the dose algorithm(s) can be developed from calibration irradiations provided by the PTL or other laboratories, such as in the case of neutrons. The algorithm shall be available to the assessor for review in order to determine appropriateness and verification of calculations and function. | Choose an item. |       |       |

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|  | **7.8** | **Reporting of results** |
|  | **7.8.2** | **Common requirements for reports (test, calibration or sampling)** |

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|  |  | The processor shall meet contract requirements for reporting dose and the requirements specified by appropriate regulatory authorities. The NRC requirements for reporting dose are specified in the Code of Federal Regulations, 10 CFR Part 20, *Standards for Protection Against Radiation*. | Choose an item. |       |       |

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|  | **7.8.3** | **Specific requirements for test reports** |

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|  | **7.8.3.1** | The final report from processors who provide dosimetry services to internal clients (i.e., dosimeters are issued to workers under the same organization, such as a utility company with a dosimetry processing division) shall include the following: |  |  |  |
|  | **a)** | facility name and/or location where dosimeter was issued/worn; | Choose an item. |       |       |
|  | **b)** | pertinent dates; | Choose an item. |       |       |
|  | **c)** | description or identification of each dosimeter and/or elements; | Choose an item. |       |       |
|  | **d)** | explanation of any deviation from the procedures affecting the reported results; | Choose an item. |       |       |
|  | **e)** | identification of anomalies; | Choose an item. |       |       |
|  | **f)** | adequately defined data resulting from the processing; and | Choose an item. |       |       |
|  | **g)** | name of NVLAP signatory who reviewed, validated, and authorized the individual's dose measurement. | Choose an item. |       |       |
|  | **7.8.3.2** | The final report from processors who provide dosimetry services to external clients shall include the following: |  |  |  |
|  | **a)** | name and address of processor and client; | Choose an item. |       |       |
|  | **b)** | pertinent dates; | Choose an item. |       |       |
|  | **c)** | description or identification of each dosimeter and/or elements; | Choose an item. |       |       |
|  | **d)** | "Occupational Radiation Exposure Report" or a similar title; | Choose an item. |       |       |
|  | **e)** | explanation of any deviation from the procedures affecting the reported results; | Choose an item. |       |       |
|  | **f)** | identification of anomalies; | Choose an item. |       |       |
|  | **g)** | adequately defined data resulting from the processing; and | Choose an item. |       |       |
|  | **h)** | signature or reference to person having technical responsibility. | Choose an item. |       |       |

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| **8** | **Management system requirements** |

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|  | **8.2** | **Management system documentation** |

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|  | **8.2.1** | If the processor uses a computer-based documentation system, the processor should consider the ease of usability by the staff. The processor shall ensure that the requirements of *NVLAP General Criteria Checklist* (ISO/IEC 17025:2017) are met so that staff is knowledgeable of the online documentation system and can readily retrieve appropriate information. | Choose an item. |       |       |
|  | **8.2.2** | The processor shall have a method for identifying dosimeters that the processor has received for testing. This identification can be used for verification of the test report and tracking the progress of the test item from receipt until the test report is sent to the client. | Choose an item. |       |       |

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|  | **8.3** | **Control of management system documents** |

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|  | **8.3.1** | The controlled version of the laboratory management system documentation may be paper-based or computer-based. Version control shall be maintained in either case. | Choose an item. |       |       |
|  | **8.3.2** | The processor shall create a cross-reference document allowing the laboratory and the assessors to verify that all requirements of ISO/IEC 17025 and NIST Handbook 150 Annexes A, B and E, as applicable, are addressed in the management system documentation. | Choose an item. |       |       |
|  | **8.3.3** | A general reference text on statistics shall be available in the laboratory. | Choose an item. |       |       |
|  | **8.3.4** | The processor shall have copies of applicable referenced standards, practices and procedures. | Choose an item. |       |       |
|  | **8.3.5** | In addition to the information specified in ISO/IEC 17025, the quality management system and/or supporting management procedures shall include the following: |  |  |  |
|  | **a)** | processing facilities and scope of services offered; | Choose an item. |       |       |
|  | **b)** | processing equipment inventory including radiation sources used for calibration; | Choose an item. |       |       |
|  | **c)** | processing equipment calibration, verification, and maintenance practices; | Choose an item. |       |       |
|  | **d)** | dosimeter models and design specifications; | Choose an item. |       |       |
|  | **e)** | acceptance criteria for dosimeter holders and materials; | Choose an item. |       |       |
|  | **f)** | procedures for handling and storing sensitive components and materials; | Choose an item. |       |       |
|  | **g)** | assembly/disassembly techniques for all dosimeter models used; | Choose an item. |       |       |
|  | **h)** | procedures for periodic checks on in-service dosimeters; | Choose an item. |       |       |
|  | **i)** | dosimeter calibration techniques and procedures; | Choose an item. |       |       |
|  | **j)** | identification and tracking of dosimeters; | Choose an item. |       |       |
|  | **k)** | handling, control and storage of in-service dosimeters; | Choose an item. |       |       |
|  | **l)** | actions concerning damaged dosimeters; | Choose an item. |       |       |
|  | **m)** | instructions to operate all processing equipment, including any operational checks; | Choose an item. |       |       |
|  | **n)** | data handling and reporting; | Choose an item. |       |       |
|  | **o)** | actions when test data indicate a possible problem exists; and | Choose an item. |       |       |
|  | **p)** | policy for utilizing subcontractors. | Choose an item. |       |       |
|  | **8.8** | **Internal audits** |  |  |  |
|  | **8.8.1** | The most recent internal audit report shall be available for review during NVLAP on-site assessments. | Choose an item. |       |       |
|  | **8.8.2** | Previous internal audit reports, as far as three years back, shall be available for review if requested by the NVLAP assessor. | Choose an item. |       |       |
|  | **8.8.3** | The internal audit shall cover compliance with NVLAP, laboratory management system, regulatory, and contractual requirements. | Choose an item. |       |       |
|  | **8.8.4** | The processor shall perform at least one complete internal audit of its management system prior to the first on-site assessment. The records will be reviewed before or during the on-site assessment visit. | Choose an item. |       |       |
|  | **8.8.5** | The processor shall perform at least one complete internal audit of its management system annually. | Choose an item. |       |       |
|  | **8.9** | **Management reviews** |  |  |  |
|  | **8.9.1** | Periodic reviews of the management system shall reflect adherence to NVLAP requirements and the laboratory's quality objectives. | Choose an item. |       |       |
|  | **8.9.2** | The periodic management reviews shall reflect positive aspects of the management system as well as nonconformities. | Choose an item. |       |       |
|  | **8.9.3** | The most recent management review report shall be available for review during NVLAP on-site assessments. | Choose an item. |       |       |
|  | **8.9.4** | Previous management review reports, as much as three years back, shall be available for review if requested by the NVLAP assessor. | Choose an item. |       |       |
|  | **8.9.5** | The processor shall perform at least one complete management review prior to the first on-site assessment. The records will be reviewed before or during the on-site assessment visit. | Choose an item. |       |       |
|  | **8.9.6** | The processor shall perform at least one complete management review annually. | Choose an item. |       |       |

**End of the NIST Handbook 150-4 Checklist.**