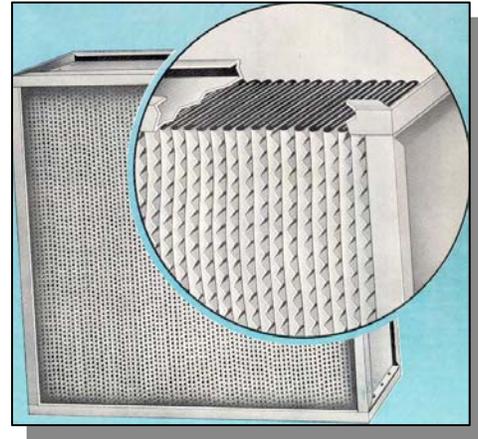


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1.0 PURPOSE & SCOPE

Purpose: The purpose of this procedure is to define the role of the IH group in the development and coordination of an effective high-efficiency particulate air HEPA Surveillance Testing Program. As a minimum, the program will comply with *ANSI N510-1995, Section 10 HEPA Filter Bank In-place Test* and the corresponding worker qualification requirements in *ASME/ANSI NQA-1-1997: Quality Assurance Requirements for Nuclear Facility Applications, Requirement 2* as required by DOE.

Scope: This program does not cover Acceptance Testing of HEPA filters as defined in *ANSI N510-1995, HEPA Testing of Nuclear Air Treatment Systems, Sections 6 –8 and 12 – 15*.

This document describes program elements necessary for compliance with nuclear facility regulations. HEPA filtration is often used in applications that are not covered by this level of regulation, including lead and asbestos abatement work and radiological laboratory hoods. For these applications, the IH Group will conduct testing in compliance with nuclear facility program elements. However, in these non-nuclear settings, some provisions (such as testing frequency and tester qualification), may not carry regulatory requirement status. In these settings, the nuclear facility requirements should be viewed as appropriate best management practices.

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BNL policy is to substitute the hazardous challenge agent Di-Octyl Phthalate, a recognized carcinogen, with the safer synthetic oil (Emery 3004).

2.0 RESPONSIBILITIES

- 2.1 This program is implemented through the SHSD Industrial Hygiene Group Leader who may assign the duties to a *HEPA Filter Program Administrator*. Members of the SHSD Industrial Hygiene Group, the Radiation Control Division Facility Support Group, and Plant Engineering, based on their qualification, can potentially be qualified to perform certain tasks in this program. Personnel who have demonstrated competency in performing a certain role, in accordance with Section 7 of this procedure, will be qualified to serve in that role by the Group Leader or Program Administrator. All filter testing will be conducted using properly trained personnel for their role who meet the requirements in *ANSI N510-1995 Section 10* and *ASME NQA-1, Requirement 2*.
- 2.2 The IH Group Leader or HEPA Filter Program Administrator shall periodically review the BNL HEPA Filter Surveillance Program to access compliance. The periodic evaluation shall occur at least once each year and shall ensure that all filter testing is conducted to meet the requirements in *ANSI N510-1995*. Attachment 9.1 may be used to document the assessment. Records of the assessment will be maintained for a minimum of 75 years.
- 2.3 It is the responsibility of persons conducting testing to comply with all provisions in this Program Procedure and Field Procedure IH62300 and/or IH62350.
- 2.4 It is the responsibility of the person conducting testing and his/her line supervisor to ensure that the appropriate personal protective equipment is worn while performing this procedure.
- 2.5 The person performing work under this program and his/her line supervisor are responsible to ensure that all required training and qualification for hazards that may be present in areas were this procedure will be used (such as respiratory protection or radiation contamination) have been met.
- 2.6 Notification of the *HEPA Filter Program Administrator* of a filter change is the responsibility of the department or division owning the system.

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3.0 DEFINITIONS

Acceptance Tests: Tests that verify that systems have been correctly installed and meet the requirements of project specifications. These test are made upon completion of fabrication, receipt, and installation, or after modification of an installed component, air cleaning unit, or system to verify that it meets the requirements specified.

Filter Bank In-place Test: A surveillance test that monitors penetration of a test agent through a filter and any gaps in the housing of the filter.

HEPA Filter: A high efficiency particulate filter having a fibrous medium with a particle removal efficiency of at least 99.97% for 0.3 micron particles of di-octyl phthalate.

HEPA Filter Program Administrator: A person, designated by the Industrial Hygiene Group Leader, to oversee compliance with the DOE Orders on HEPA filter testing for SHSD.

Housing: The portion of an air-cleaning unit that encloses air-cleaning components and provides connections to adjacent ductwork.

Level 1 Tester: A BNL defined title for the highest level of competency in qualified employees. The qualification requirements for this position are defined in Section 7.

Level 2 Assistant: A BNL defined title for the lower level of competency for employees. These employees serve a role as a fully supervised assistant in field-testing. This position often represents a temporary assignment of very short duration (1-3 days). The qualification requirements for this position are defined in Section 7.

Surveillance Tests: Tests that monitor the condition of systems that have previously passed an Acceptance Tests. In particular, it consists of an in-place leak test and visual inspection performed periodically to establish the current condition of a nuclear air treatment system and its components, with respect to bypasses and damage to filters and absorber.

4.0 PREREQUISITES

Personnel:

- 4.1 Only persons who have demonstrated competency, to the satisfaction of the IH Group Leader *or HEPA Filter Program Administrator* will be qualified to perform the role of *Level 1 Tester* in this program. The qualification criteria are described in Section 7.
- 4.2 Only persons who have demonstrated competency, to the satisfaction of the IH Group Leader, HEPA Filter Program Administrator, *or Level 1 Tester* will be qualified to perform the role of *Level 2 Assistant* in this program. The *Level 2 Assistant* qualification criteria are described in Section 7.

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Test Procedure Qualifiers and Limitations:

- 4.3 This program covers only *ANSI N510 Section 10* procedures. Only ventilation equipment that has been previously qualified under *ANSI N510 Sections 6 to 9 and 11 to 15* should be tested by this procedure. The owner of the equipment should maintain records of equipment qualification and verify that the equipment meets the ANSI Acceptance Test requirements.
- 4.4 Some portions of *ANSI N510 Section 5 Visual Inspection* can be performed by the *Level 1 Tester* during *ANSI N510 Section 10* testing, however, this program does not cover all the elements of an *ANSI N510 Visual Inspection*. This program does not certify a HEPA filter installation for compliance with *ANSI N510 Section 5*. Testing done under this program should only be performed on systems that have a current status of compliance with *ANSI N510 Section 5* requirements.
- 4.5 A prerequisite for *ANSI N510 Section 10 Filter Bank In-place testing* is a measurement of air flow capacity in compliance with the *ACGIH Ventilation Manual* and the measurement of pressure drop across the filter bank. *ANSI N510 Section 10 Filter Bank In-place testing* shall not be performed by the *Level 1 Tester* on filters that have not had these two ventilation measurements recorded.
- 4.5.1 Airflow testing is outside the scope of this HEPA Surveillance Program. Personnel of the SHSD IH Group may be competent to perform some of the airflow measurements, however if IH Group personnel perform airflow testing, they shall comply with the other BNL written procedures on ventilation testing applicable at the time of testing.
- 4.6 Prior to *ANSI N510 Section 10 Filter Bank In-place testing*, the location of the upstream sample and injection ports should have been qualified as per *ANSI N510 Section 9 Air-Aerosol Mixing Uniformity Test*. An *ANSI N510 Section 9* test should have been performed at completion of initial system installation and after modification or major repair. *ANSI N510 Section 9* testing is outside the range of services provided by the IH Group in the program described in this program procedure and IH62300. Note: An *ANSI N510 Section 9 Air-Aerosol Mixing Uniformity Test* is not required in *ANSI N510* for single HEPA filter banks. Thus, it is not required for most laboratory hoods, most vacuum cleaners, and many local exhaust systems.
- 4.7 Air cleaning equipment and components used in Nuclear Power Plants should meet *ASME N509-1996: Nuclear Power Plant Air-Cleaning Units and Components*, unless the system has met other appropriate criteria set in an approved system specification (technical specifications). The IH Group *ANSI N510 Section 10 Filter Bank In-place*

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tests are valid for nuclear facilities only if the equipment meets the *ASME N509* requirements. The responsibility to ensure compliance with *ASME N509* lies on the owner of the equipment.

5.0 PRECAUTIONS

- 5.1 Contamination: It is possible that some surfaces may have radiation contamination or chemical contamination. In these cases, personal protective equipment and administrative controls must be implemented for the radiation and contaminant hazards. The testing equipment may become contaminated. After testing system, have the Facility Support personnel survey the equipment for radiological contamination.
- 5.2 PPE: Appropriate personal protective equipment to protect the person conducting the testing must be used. At a minimum, disposable gloves must be used when contacting the HEPA surface material that has been exposed to contaminants. The gloves must be impermeable to the surface contaminant. When the potential for contamination of the body can occur, the use of disposable clothing to cover the areas of contact is required. When the potential for exposure to airborne contaminants above the ACGIH TLV or STEL or OSHA PEL (which ever is lower) may occur, the person collecting the sample must use appropriate respiratory protection in compliance with the BNL Respiratory Protection Program.

6.0 PROCEDURE

- 6.1 The *Filter Bank In-place test* (aerosol test), described in IH62300 is performed as per specifications in *ANSI N510-1995* Section 10.
- 6.2 Di-octyl Phthalate (DOP), a regulated carcinogen, that is cited in *ANSI N510*, has been replaced in this program with **Emery 3004**, a poly-alpha-olefin, with comparable aerodynamic properties and lower toxicity. Do not use DOP.
- 6.3 Test apparatus consists of:
- 6.3.1 Compressed air operated *Nucon* F-1000-SN-10 Slit Nozzle aerosol generator.
 - 6.3.2 Aerosol Detector, *Nucon* F-1000-DDF Aerosol Detector.
 - 6.3.3 Aerosol-Emery 3004, or equivalent alternative.

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6.4 The test frequency for *Filter Bank In-place tests* will be:

- 6.4.1 Nuclear facilities: Initially, annually (or as otherwise required in the system technical specifications), and after any filter change or system modification.
- 6.4.2 Radiological stationary hoods, portable air handling units, and vacuum cleaners: Initially, annually (or as otherwise required in the system technical specifications) and after any filter change or system modification.
- 6.4.3 Non-nuclear and non-radiological stationary hoods, portable air handling units, and vacuum cleaners (such as mercury and asbestos): The recommended testing frequency is initially and at each filter change (rather than on a periodic basis). The official basis of frequency of testing is the SBMS Subject Area: *Exhaust Ventilation*.

6.5 Calibration of equipment: Portable test equipment used in this program will be calibrated on an annual basis by the manufacturer of equipment, or by an equivalent, independent calibration service provider. The IH Group will maintain records for a minimum of 75 years.

6.6 Records of the testing will be done on forms contained in IH62300. The IH Group will maintain the records for a minimum of three years.

6.7 The air cleaning system shall be tested at standard operating conditions of airflow (design flow rate +/- 10%) and at normal operating pressure during testing. If more than one flow rate is required for operation, the test shall be performed at each flow rate. If the design has a variable flow rate, then the minimum and maximum (+/- 10%) shall both be used to perform the tests.

6.8 The IH Group will provide written results of the testing to the owner of the HEPA system or requestor of the testing within 30 days of completion of testing.

6.9 The filtration system integrity must achieve a minimum of 99.97% efficiency for the system to be reported as passing the In-place test, unless the system has other appropriate criteria set in an approved system specification (e.g. technical specifications).

7.0 IMPLEMENTATION & TRAINING

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- 7.1 The IH Group Leader, or his/her designee, shall qualify persons to perform fieldwork under this program.
- 7.2 Two levels of roles and tasks for employees are established under this program:
- The highest level of work is qualification as a *Level 1 Tester* and is held by a person with a high level of proficiency demonstrated by a complete knowledge of the theory and practical aspects of the test program. *Level 1 Testers* are qualified to perform the *Surveillance tests* independent of direct supervision. The IH Group Leader or the *HEPA Filter Test Program Administrator* shall qualify *Level 1 Testers*.
 - The lower level of work role is a *Level 2 Assistant*. This level signifies a person with a no specific knowledge of the test procedure whose role is to assist a *Level 1 Tester*. The *Level 2 Assistant* only serves under the direct supervision of the *Level 1 Tester* and does not perform any measurements in the method. A *Level 2 Assistant* is not qualified to perform the *Surveillance test* independently.
- 7.3 The qualification criteria for a *Level 1 Tester* are:
- 7.3.1 An overall knowledge of industrial hygiene practice.
- 7.3.2 Specific knowledge of this procedure, field-test procedure IH62300, IH62350, and *ANSI N510*. This can be gained from work experience or training course work.
- 7.3.3 Demonstrated competency in performing this test to the satisfaction of the IH Group Leader or HEPA Filter Program Administrator via:
- visual observation of the sample technique in use
 - ability to answer questions on the procedure.
- 7.3.4 Knowledge of the appropriate personal protective equipment for the hazards of this particular type of sampling.
- 7.4 The SHSD IH Group Leader will maintain a record of personnel who have passed the competency tests for *Level 1 Tester* and transfer the record to the BNL BTMS Administrator for inclusion in that database. Records of qualification will be maintained, at a minimum, for a period of three years or until replaced with the next cycle of qualification. *Attachment 2* should be used to document *Level 1 Tester* qualification.
- 7.5 *Level 1 Tester* personnel shall be re-qualified at a frequency not to exceed three years, provided there is no break of more than one year in the work assignment that utilizes this procedure by the individual. If a person has not performed filter testing for a

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period of over one year from the date of last qualification, re-qualification to perform this procedure will be required before testing commences.

7.6 Level 2 Assistants shall demonstrated competency in performing their role in this test to the Level 1 Tester before assisting in the test. The Level 2 Assistant shall also have knowledge of the appropriate personal protective equipment for the hazards of this particular type of testing.

7.7 *Level 2 Assistants* will be qualified on the day of fieldwork by the *Level 1 Tester*, HEPA Program Administrator, or IH Group Leader and the qualification will last for that day only. Documentation of the *Level 2 Assistants* assignment of duties shall consist of recording the name of the person on testing records. The IH Group will not maintain a formal list of *Level 2 Assistants*. A *Level 2 Assistant* shall be re-qualified prior to testing, if that person has not conducted testing within the last 30 days.

8.0 REFERENCES

- 8.1 *ANSI N510-1995, Testing of Nuclear Air Cleaning System.*
- 8.2 *ERDA 76-21, Nuclear Air Cleaning Handbook.*
- 8.3 *ASME N509-1996: Nuclear Power Plant Air-Cleaning Units and Components.*
- 8.4 BNL SHSD Procedures, *IH62300 Field Procedures for In-Place Testing of HEPA Filter Systems* and *IH62350 Field Procedures for Testing of HEPA Filter Vacuum Cleaners.*
- 8.5 DOE *Radiological Control Manual*, Chapter 4.
- 8.6 BNL SBMS Subject Area: *Exhaust Ventilation.*

9.0 ATTACHMENTS

- 9.1 Annual Compliance Audit Checklist form
- 9.2 *Qualification Documentation Level 1 Tester* form

10.0 DOCUMENTATION

The only official copy is on-line at the SHSD IH Group website.
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Document Development and Revision Control Tracking		
Prepared By: <i>(signature/date on file)</i> R. Selvey 3/12/00 Certified Industrial Hygienist	Reviewed By / Date: <i>(signature/date on file)</i> R. Wilson 3/12/00 HEPA Filter Tester Level 1 Administrator	Approved By / Date: <i>(signature/date on file)</i> R. Selvey 3/12/00 Industrial Hygienist Group Leader
ESH Coordinator/ Date: <i>none</i>	Work Coordinator/ Date: <i>none</i>	SHSD Manager / Date <i>none</i>
QA Review / Date: <i>(signature/date on file)</i> S. Sengupta 3/23/99	Training Coordinator / Date: <i>none</i>	Filing Code: IH52
Facility Support Rep. / Date: <i>none</i>	Environ. Compliance Rep. / Date: <i>none</i>	Effective Date: 11/19/02
ISM Review - Hazard Categorization <input type="checkbox"/> High <input checked="" type="checkbox"/> Moderate <input type="checkbox"/> Low/Skill of the craft	Validation: <input type="checkbox"/> Formal Walkthrough <input type="checkbox"/> Desk Top Review <input type="checkbox"/> SME Review Name / Date:	Implementation: Training Completed: Tracked in BTMS Procedure posted on Web: 06/01/07 Hard Copy files updated: 06/01/07 Document Control on forms: 06/01/07

Revision Log		
Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input checked="" type="checkbox"/> none of the above Section/page and Description of change: Revised on 07/07/00 to new SBMS format. No significant text changes made.		
R. Selvey 07/07/00 <i>(signature on file)</i> SME Reviewer/Date:	Reviewer/Date:	Reviewer/Date:
Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input checked="" type="checkbox"/> none of the above Section/page and Description of change: Added Web Site banner and reviewed document for most recent format changes. No changes needed.		
R. Selvey 01/31/01 <i>(signature on file)</i> SME Reviewer/Date:	SME Reviewer/Date:	SME Reviewer/Date:
Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input checked="" type="checkbox"/> none of the above Section/page and Description of change: Changed SOP number from IH-PP-8 to IH62200 under new format. Reviewed and made minor editorial and format changes.		
R. Selvey 03/08/01 <i>(signature on file)</i> SME Reviewer/Date:	SME Reviewer/Date:	SME Reviewer/Date:

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Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input checked="" type="checkbox"/> none of the above Section/page and Description of change: SOP numbers revised to reflect new numbering, no significant changes to text necessary. Section numbers updated to most recent ESH&Q format.		
R. Selvey 11/19/02 (<i>signature on file</i>) SME Reviewer/Date:	SME Reviewer/Date:	SME Reviewer/Date:
Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input checked="" type="checkbox"/> none of the above Section/page and Description of change: Review and minor corrections. Links to the revised wording in IH62300 made. Concurrence by R. Wilson, Level 1 tester.		
R. Selvey 02/23/04 (<i>signature on file</i>) SME Reviewer/Date:	SME Reviewer/Date:	SME Reviewer/Date:
Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input checked="" type="checkbox"/> none of the above Section/page and Description of change: Added contamination survey precaution. Updated Qualification form to newer format and number.		
R. Selvey 07/01/04 (<i>signature on file</i>) SME Reviewer/Date:	SME Reviewer/Date:	SME Reviewer/Date:
Purpose: <input type="checkbox"/> Temporary Change <input type="checkbox"/> Change in Scope <input checked="" type="checkbox"/> Periodic review <input type="checkbox"/> Clarify/enhance procedural controls Changed resulting from: <input type="checkbox"/> Environmental impacts <input type="checkbox"/> Federal, State and/or Local requirements <input type="checkbox"/> Corrective/preventive actions to non-conformances <input checked="" type="checkbox"/> none of the above Section/page and Description of change: Triennial review. Added JRA to Section 5. Revised Attachment 9.2 for Document Control.		
R. Selvey 6/01/07 (<i>signature on file</i>) SME Reviewer/Date:	SME Reviewer/Date:	SME Reviewer/Date:

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Attachment 9.1 Periodic Compliance Self-Assessment Checklist

YEAR _____

Item	Criteria	Yes/No ⁽¹⁾
1	Have the <i>ANSI N501</i> , <i>ASME NQA-1</i> , or <i>ANSI N509</i> consensus standards or DOE Orders regarding HEPA Filter Testing been updated during this audit period ?	
1b	If item 1 is yes, has IH62200, IH62300 and IH62350 been updated to reflect the changes ?	
2	Are personnel qualification records (<i>Level 1 Tester</i>) up-to-date and the documentation properly maintained ?	
3	Was test equipment calibrated within the specified times and records appropriately maintained ?	
4	Are records of filter testing, conducted during the period, appropriately filled out and properly maintained for future access (including the last three years records properly stored) ?	
5	Where results of testing appropriately conveyed to the requester of the HEPA filter system test in a timely manner (within 30 days)?	
6	Observation of an In-place Filter Test: Was the test conducted in accordance with all steps and requirements in IH62300 or IH62350? Date of observation: _____ Observed By: _____ Location of system: _____	

	Name	Date
Reviewed Performed By:		
Review Approved By:		

(1) Attach any supporting documentation for the status to this record.

Recordkeeping: This record is to be kept until 75 years from the Review Approval Date.

HEPA Filter Surveillance Level 1 Tester

Job Performance Measure (JPM) Completion Certificate

Candidate's Name	Life Number:
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Activities qualified to perform: Level 1 Tester in Penetration testing of fixed and portable HEPA filtration systems using ANSI N510 methodology, as per BNL IH62200, IH62300 and IH62350. Basis used for certification is education, experience, mentoring, and on the job training.

Practical Skill Evaluation: Demonstration of Evaluation Methodology by Oral Exam

Criteria	Qualifying Performance Standard	Unsat.	Recov.	Satisf.
1. Hazard Analysis	Understands the need to perform a hazard analysis of the area and potential exposure to the self as sampler and workers in the area.			
2. Personal Protective Equipment	Understands the need to be aware of the potential surface contamination, airborne levels of contaminants, radiological hazards, and noise hazard. Knows how to determine the need for PPE.			
3. Sampling Equipment	Knows where equipment needed for the procedure is located and how to properly sign it out.			
4. Pre-Testing Inspection	Verifies the system to be monitored is operational and represents typical operation. Makes notation in sampling record if the operating conditions are atypical.			
5. Aerosol Generator	Demonstrates how to correctly operate the generator.			
6. Photometer	Demonstrates how to correctly operate the meter.			
7. Measurement of HEPA challenge agent penetration	Knows how to properly measure system performance			
8. Operating Parameters	Knows the theory to establish operating parameters (safety envelope) for the equipment.			
9. Documentation	Demonstrates correctly filling out IH HEPA Filter Test Record forms. Transfers appropriate info to IH databases			

I accept the responsibility for performing this task as demonstrated within this JPM and the corresponding SOP.

Candidate Signature:	Date:
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I certify the candidate has satisfactorily performed each of the above listed steps and is capable of performing the task unsupervised.

Evaluator Signature:	Date:
----------------------	-------