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BROOKHAVEN NATIONAL LABORATORY Safety & Health Services Division	NUMBER IH60660
	REVISION FINAL rev 0
INDUSTRIAL HYGIENE GROUP Standard Operating Procedure	DATE 03/08/01
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	SUBJECT: Program Procedure
Instrument Calibration and Maintenance Program	

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1.0 Purpose & Scope

This document describes the SHSD Industrial Hygiene Group *Calibration and Maintenance Schedule policy* for direct reading instrument and air sampling pumps. Its purpose is to establish BNL policy on the frequency and mechanism for calibration and repair of IH instrumentation.

The goal of the procedure is to provide a uniform protocol for preserving IH instrumentation in a manner that will result in accurate, precise, and reliable readings from the instruments.

Procedures for maintenance and/or calibration of individual pieces of equipment are documented in separate SOPs within the IH Group's written documentation.

2.0 Responsibilities

- 2.1 Program Administration:** This procedure is administered through the SHSD Industrial Hygiene Group. Members of the SHSD Industrial Hygiene Group are required to follow this procedure.

3.0 Definitions

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- 3.1 **Program Administrator:** A person designated by the IH Group Leader or SHSD management to administer this procedure and associated sampling equipment management.
- 3.2 **Equipment Custodian:** A person designated by the IH Group Leader or Program Administrator to process equipment for maintenance and calibration in accordance with this procedure.

4.0 Prerequisites

- 4.1 **Qualification Criteria:** Only individuals who have demonstrated knowledge of this procedure to the satisfaction of the IH Group Leader, the Program Administrator, or their designee will be qualified to perform any activities described in this procedure. The qualification criteria to conduct work following this procedure are:
- 4.1.1 Specific knowledge of this procedure shown by an ability to answer questions on procedure.
 - 4.1.2 Personnel shall be re-qualified at a frequency not to exceed three years.
 - 4.1.3 If significant and substantive changes to the procedure are made, all qualified *Equipment Custodians* will be notified of the changes.
 - 4.1.4 Personnel performing maintenance on energized electrical meters or pumps in a condition that potentially exposes them to the energy source (meets definitions of “hot work”) must meet all BNL training and medical approval requirements.

5.0 Precautions

- 5.1 **Personal Protective Equipment:** The use of personal protective equipment to protect personnel handling IH instrumentation during preparation for calibration and maintenance is not typically required.

If it is necessary to handle equipment with potential surface contamination, at a minimum, disposable gloves must be used when contacting the exposed surfaces. All handling of contaminated equipment must be done within a laboratory hood.

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- 5.2 **Radiation Contamination:** It is possible that some equipment may have been taken into areas with radiation contamination. The SHSD person handling equipment must verify from the RCD that the equipment has been analyzed for the radiation hazard and are at radiation contamination levels below the permissible release limits to the general public.

6.0 **Procedure**

- 6.1 **Equipment:** Calibration Labels, from BNL PPM Stock or equivalent. See Section 6.5 for wording.
- 6.2 **Determining the frequency of calibration.** Refer to *Attachment 8.1* to this procedure for a list of IH instrumentation and the BNL determined calibration frequency. Calibrations must be completed within the frequency listed in *Attachment 8.1* or the equipment must be removed from service.
- 6.3 **Establishing the Frequency of calibration.** The Calibration the frequency listed in *Attachment 8.1* will be determined by the Program Administrator based on the following hierarchy of references (based on DOE O 414.1A):
- 6.3.1 Manufacturers recommendation as stated in the instruments *Operation Manual* or *Owner's Instruction Manual*.
 - 6.3.2 Manufacturers recommendation as stated in other means of communication with BNL, such as memorandum, e-mails, or documented phone conversations.
 - 6.3.3 Other engineering/scientific standards specifically referring to a particular type of instrumentation.
 - 6.3.4 BNL determination of calibration needs based on experience with the equipment or recommendations by other sources.
- 6.4 **Calibration Procedures:** This SOP does not provide specific calibration procedure methodology. Follow BNL IH Group written procedures specific to instruments that BNL performs calibrations "in-house" for the methodology for calibration.

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6.5 **Documenting Calibration Status:** The on-going calibration status of each SHSD electronic instrument (other than sampling pumps) must be marked on the meter by means of a label on the meter. The label must, at a minimum, indicate that the meter is “calibrated” and show the date of expiration.

- 6.5.1 For meters calibrated by non-BNL vendors, the label should be placed on the meter. BNL will add any of the following missing information on an auxiliary label: company name performing calibration, date of calibration, and expiration or due date.
- 6.5.2 The sticker used by SHSD for “in-house” calibration must contain at least the following wording:

CALIBRATED	
BY _____	DATE _____
DUE _____	

- 6.5.3 For equipment that is out of service and has expired on the acceptable calibration interval, but is being held in reserve as a potential replacement, a label with the following wording shall be prominently placed on the equipment:



- 6.5.4 **Maintenance of Instruments:** The SHSD IH group policy on routine maintenance for equipment:
 - 6.5.4.1 **Sampling Pumps:** Repair and routine replacement of expendable parts such as diaphragms and batteries shall be done as needed when instruments fail to calibrate or fails operate within required parameters.
 - 6.5.4.2 **Meters and Instruments:**

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6.5.4.2.1 Off-site Calibration- Meters receive routine maintenance during their periodic calibration by off-site vendors.

6.5.4.2.2 On-site Calibration- Meters calibrated by BNL will receive maintenance or repair if they fail to calibrate within specifications or fail to operate within typical parameters.

6.5.4.3 Damage or abuse: When SHSD meters show signs of damage or abuse they will be repaired by BNL or the manufacturer as needed.

7.0 References

7.1 DOE Order 414.1A.

7.2 Numerous manufacturers' operation manuals were reviewed in the creation of Attachment 8.1. References to manufacturers are included in Attachment 8.1.

8.0 Attachments

8.1 **Attachment 8.1:** BNL Instrument Calibration Frequency Policy

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I. Air Sampling Equipment

Meter	Manufacturer &Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
SKC Low Flow Pump Model: SKC 222-3	SKC	Recommendation Reference: Operation Manual Manual Date: Page:	Prior to and after each use	BY IHG via - DryCal - Soap Film Flow Meter
SKC High Flow Pump Model: SKC 224-43XR SKC 224-44XR	GAST	Recommendation Reference: Operation Manual Manual Date: Page:	Prior to and after each use	BY IHG via - DryCal - Soap Film Flow Meter - Singer Dry Test Meter
GAST High Flow Pump Model: GAST	GAST	Recommendation Reference: Operation Manual Manual Date: Page:	Prior to and after each use	BY IHG via - DryCal - Dry Test meter
Dry Cal Calibrator Model: BIOS DC-1	Bios International Corp. 230 W. Parkway Unit 1 Pompton Plains, NJ 07444 800-663-4977	Recommendation Reference: No recalibration required Operation Manual Manual Date: 2/5/97 Page: section 2.0	Annual	IHG with Soap Film Flow Meter multipoint calibration or Off-site Vendor
Singer Dry Test Meter Model:	American	Recommendation Reference: Operation Manual Manual Date: Page:	Annual	IHG with Soap Film Flow Meter multipoint calibration or Off-site Vendor

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I. Air Sampling (Continued)

Meter	Manufacturer &Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
VelociCalc Air Velocity Meters Models: 8355/8357 and 8360	TSI Incorporated ATT: Customer Service 500 Cardigan Road Shoreview, MN 55126 Phone: (612) 483-4711 (800) 876-9874 FAX: (612) 490-2874	Recommendation Reference: Annual Operation Manual Manual Date: 2/92 Page: 32	Annual	RCD IC wind tunnel or Offsite vendor
Alnor Compuflo Air Velocity Meter Models: 8500D-11	Alnor 7555 N. Linden Ave. Skokie, IL 60097 312-677-3500	Recommendation Reference: No recommendation stated Operation Manual Manual Date: 1984 Page: 13	Out of service , held as back-up for TSI anemometers, if used Annual	RCD IC wind tunnel or Offsite vendor
Alnor Swinging Vane Anemometer Models: 6000P	Alnor 7555 N. Linden Ave. Skokie, IL 60097 312-677-3500	Recommendation Reference: Not required Operation Manual Manual Date: 11/77 6270 Page: 13	Annual	RCD IC wind tunnel or Offsite vendor

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II. Chemical Analyzers

Meter	Manufacturer & Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
Jerome Mercury Vapor Analyzer Model: Jerome 431-X	Arizona Instrument 4114 East Wood Street Phoenix, AZ 85040-1941 (602) 470-1414 (800) 235-3360 FAX: (602) 470-1888	Recommendation Reference: Annually Operation Manual Manual Date: July, 1996 Page: 12	Annual	Offsite Vendor
Bacharach Sentinel Personal Gas Monitor Model: Sentinel 44T	Bacharach 625 Alpha Drive Pittsburgh, PA 15238-2878 Phone: (412) 963-2000	Recommendation Reference: As per user set intervals Operation Manual Manual Date: 5/95, Rev. 2 Pages: 5-9 & 8-2	Annual (minimum), target goal is Quarterly	IHG single point calibration with standard gas mixture
			Before and After each use	IHG bump check with gas for each sensor to be used.
Ozone- UV Photometric Ozone Analyzer Model: 1008-PC	Dasibi Environmental Corp. 506 Paula Ave. Glendale, Calif. 91201	Recommendation Reference: No recommendation stated Operation Manual Manual Date: 1990 Page: 6-1, 6-11	3 years	Factory or off-site vendor calibration, maintenance, and check of internal generation source lamp
			Annual	IHG multiple point calibration with internal ozone generation source
K&D IAQ Indoor Air Quality Monitor Model: KD451	K.D. Engineering Unit 34 4291 Meridian Street Bellingham, Washington 98226 Phone: (800) 308-7717 FAX: (800) 739-4497 Email: info@teamkd.com	Recommendation Reference: No recommendation stated Operation Manual Manual Date: July, 1999 Page: 10	2 year	Off-site vendor or manufacturer maintenance and calibration of sensors
			Annual	IHG calibration via single point calibration for CO and CO2
Chlorine- Compact Portable Analyzer 4000 Series	Interscan Corporation PO Box 2496 Chatsworth, CA 91313-2496 Phone: (800) 458-6153	Recommendation Reference: Dependent on use, and sensor sensitivity Operation Manual Manual Date: 1991	Annual	Offsite Vendor

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Meter	Manufacturer &Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
Model: 4340SP Chlorine		Page: 3-3		
RAM Real-Time Aerosol Monitor Model: RAM-1	GCA/Environmental Instruments Burlington Road Bedford, MA 01730 Phone: (617) 275-5900	Recommendation Reference: No Recommendation stated Operation Manual Manual Date: 9/79 Page:	Annual	Off-site vendor
FAM Fibrous Aerosol Monitor Model: FAM-1	GCA/Environmental Instruments Burlington Road Bedford, MA 01730 Phone: (617) 275-5900	Recommendation Reference: 500 hrs or 1 year Operation Manual Manual Date: 8/88 Page: 25	Annual	Off-site vendor
NUCON Aerosol Detector Model: Model F	Nuclear Consulting Services, Inc. 7000 Huntley Road Columbus, Ohio 43229-1035 Phone: (614) 846-5710 FAX: (614) 431-0858	Recommendation Reference: Field Calibration Checks for Normal Use Operation Manual Manual Date: 11/90 Rev. 1 Page: 5	Annual	Off-site vendor
NITON XRF Spectrum Analyzer Model: 300 & 700 Series	NITON Service 610 Ten Rod Road North Kingstown, RI 02852 Voice: (401) 294-1234 FAX: (401) 295-2090 Email: support@niton.com	Recommendation Reference: Every 24 months Operation Manual Manual Date: 1998 Page: Page 1-12	2 year or each source change which is less	Off-site vendor or manufacturer
			Prior to and after each use	IHG check of field reference standards

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Meter	Manufacturer &Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
Warrngton XRF Analyzer Model:	Warrington	Recommendation Reference: Every 24 months Operation Manual Manual Date: 1998 Page: Page 1-12	Out of Service Meter to be held out-of-service as replacement for Niton XRF, will require calibration before use and then on 2 year cycle 2 year or each source change which is less	Off-site vendor or manufacturer
			Prior to and after each use	IHG check of field reference standards
H-Nu PID Photo-ionization Detector Model: PI-101 10.2 eV & 11.0 eV	HNu Systems Inc.	Recommendation Reference: Frequency not specified Operation Manual Manual Date: 1975 Page: 19	Out of Service Meter to be held out-of-service as replacement for TVA-1000, will require calibration before use and then on 1 year cycle	IHG via single point calibration with isobutylene standard
Sapphire Infrared Analyzer Model: Miran 205B	Thermo Environmental Instruments 8 West Forge Parkway Franklin MA 02038	Recommendation Reference: Factory Calibration on initial shipment, user perform calibration built internal into meter. Page 99 provides method for user calibration. Additional info MI-611-035 Operation Manual Manual Date: 3/99 Page: 48 and 99	Qualitative analysis use only (non OEL) – prior to each use	IHG bump test with any chemical in instrument inventory
			Quantitative Analysis for OEL compliance- Annual	IHG calibration for compound of interest using closed loop or Offsite Vendor
Miran-1B2 Infrared Analyzer Model: Miran 1B2	Foxboro Thermo Environmental Instruments 8 West Forge Parkway Franklin MA 02038	Recommendation Reference: Pathlength: after 1000 hours “Ability to measure the concentration of a vapor lies in the way the analyzer is precalibrated at the factory.” p. 27 Operation Manual Manual Date: 10/88 Page: 24, 27	Out of Service Meter to be held out-of-service as replacement for Sapphire, will require calibration before use and then on 1-year cycle.	IHG to a single compound using closed loop or Offsite Vendor

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Meter	Manufacturer &Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
TVA-1000 PID/FID Analyzer Model: TVA-1000	Foxboro Thermo Environmental Instruments 8 West Forge Parkway Franklin MA 02038	Recommendation Reference: Beginning of each workday w/ calibration gas Operation Manual Manual Date: 8/31/93 Page:25	Qualitative analysis use only (non OEL) – prior to each use	IHG bump test with any chemical in instrument inventory
			Quantitative Analysis for OEL compliance- Each day of use	IHG calibration for compound of interest using closed loop or Offsite Vendor
Voyager Gas Chromatograph Model: Voyager	PE Photovac 761 Main avenue Norwalk CT 06859 203-761-5330	Recommendation Reference: Start of each day and at 8 hours using calibration gas standard Operation Manual Manual Date: 12/97 Page: 59 & 9	Qualitative analysis use only (non OEL) – prior to each use	IHG bump test with any detectable chemical
			Quantitative Analysis for OEL compliance- Annual	IHG via single point calibration with cylinder standard
CAHN Micro balance	Cahn 16207 S. Carmenita Rd. Cerritos, CA 90701 213-926-3378	Recommendation Reference: Each time power is lost Operation Manual Manual Date: no date Page:6	Each time power is lost & Annual	IHG test with two Cahn calibration sources, if out of calibration so that it cannot be electronically set, vendor service call will be made.

III. Non-ionizing Radiation Meters

Meter	Manufacturer & Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
<p>Holiday Clamp On Induced Current Meter</p> <p>Model: HI-3702</p>	<p>Holiday Industries, Inc. 14825 Martin Drive Eden Prairie, Minnesota 55344 Phone: (612) 934-4920 FAX: (612) 934-3604 Email: Sales@holadyinc.com</p>	<p>Recommendation Reference: Yearly</p> <p>Operation Manual Manual Date: 1/98 Page: 14</p>	Annual	Off-site vendor
<p>Holiday VDT Radiation Survey Meter</p> <p>Model: HI-3600 VLF HI-3600-02 ELF</p>	<p>Holiday Industries, Inc. 14825 Martin Drive Eden Prairie, Minnesota 55344 Phone: (612) 934-4920 FAX: (612) 934-3604 Email: Sales@holadyinc.com</p>	<p>Recommendation Reference: No Recommendation stated</p> <p>Operation Manual Manual Date: 08/89 Page:</p>	<p>Out of Service for OEL compliance monitoring</p> <p>Can be used for qualitative detection of fields, but not quantifying field strength without Annual calibration</p>	Off-site vendor
<p>Holiday Magnetic Field Monitor</p> <p>Model: HI-3550</p>	<p>Holiday Industries, Inc. 14825 Martin Drive Eden Prairie, Minnesota 55344 Phone: (612) 934-4920 FAX: (612) 934-3604 Email: Sales@holadyinc.com</p>	<p>Recommendation Reference: Annual</p> <p>Operation Manual Manual Date: 11/93 Pages: 10 & 11</p>	Annual	Off-site vendor
<p>Holiday Microwave Oven Meter</p> <p>Model: 1501</p>	<p>Holiday Industries, Inc. 14825 Martin Drive Eden Prairie, Minnesota 55344 Phone: (612) 934-4920 FAX: (612) 934-3604 Email: Sales@holadyinc.com</p>	<p>Recommendation Reference: 12 months</p> <p>Operation Manual Manual Date: 2/90 Page: 9</p>	Annual	Off-site vendor

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Meter	Manufacturer & Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
Holaday 3-Axis ELF Magnetic Field Meter Model: 3627	Holaday Industries, Inc. 14825 Martin Drive Eden Prairie, Minnesota 55344 Phone: (612) 934-4920 FAX: (612) 934-3604 Email: Sales@holadyinc.com	Recommendation Reference: Annual Operation Manual Manual Date: 6/92 Page: 20	Annual	Off-site vendor
Narda Broadband Isotropic Radiation Monitor Model: 8306b/ 8616	Narda 435 Moreland Road Hauppauge, NY 11778 Phone (631) 231-2700 FAX: (631) 231-1711 Email: nardaeast@L-3com.com	Recommendation Reference: No recommendation stated Operation Manual Manual Date: 11/76 Pages: 4: 6-14	Out of Service- Meter to be held out-of-service as replacement for Narda 8718B, will require calibration before use and then on 2 year cycle	Out of Service
		Narda Calibration Service User's Guide 12 months		
Narda Electromagnetic Radiation Survey Meter (yellow case) Model: 8718B	Narda 435 Moreland Road Hauppauge, NY 11778 Phone (631) 231-2700 FAX: (631) 231-1711 Email: nardaeast@L-3com.com	Recommendation Reference: Every 2 years Operation Manual Manual Date: 2/2000 Pages: 129	2 year	Off-site vendor
Narda Microwave Oven Survey Meter Model: 8110	Narda 435 Moreland Road Hauppauge, NY 11778 Phone (631) 231-2700 FAX: (631) 231-1711 Email: nardaeast@L-3com.com	Recommendation Reference: No recommendation stated Operation Manual Manual Date: 7/70 Pages:	Out of Service- Meter to be held out-of-service as replacement for Holaday 1501, will require calibration before use and then on 2 year cycle	Out of Service
		Narda Calibration Service User's Guide 12 months		

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Meter	Manufacturer &Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
FW Bell Hand-held Gauss/Tesla Meter Model: Model 4048	F.W. Bell 6120 Hanging Moss Road Orlando, FL 32807 Phone: (407) 678-6900	Recommendation Reference: No Recommendation stated Operation Manual Manual Date: 881001 TD 360686 Page: entire manual reviewed	Annual	Off-site vendor or IHG check to NIST standard source
Walker Static Magnetic Field Meter Model: FGM-3D1	Quality Assurance Product Group Rockdale Street Worcester, MA 01606 Phone: (508) 852-3674 FAX: (508) 856-9931	Recommendation Reference: No Recommendation stated Operation Manual Manual Date: no date Page: 21	None- no OEL compliance use allowed without calibration	Meter NOT o be used for OEL compliance monitoring (meter range is too sensitive for use without cancellation of earth's magnetic field, source must removed or shut off to zero meter)
International Light Visible Light Meter Radiometer/Photometer Model: IL1400A	International Light, Inc. 17 Graf Road Newburyport, MA 01950-4092 Phone: (508) 465-5923 FAX: (508) 462-0759	Recommendation Reference: No frequency recommendation. Factory pre-sale Cal is by electronic means and manual implies that no re-calibration is needed. Operation Manual Manual Date: Rev. 920210 Page: 27	No calibration required for qualitative check use No OEL compliance use without annual calibration	Off-site vendor
International Light UV Actinic Radiometer Model: IL 530	International Light, Inc. 17 Graf Road Newburyport, MA 01950-4092 Phone: (508) 465-5923 FAX: (508) 462-0759	Recommendation Reference: Operation Manual Manual Date: Page:	Out of service No OEL compliance use allowed without calibration	Off-site vendor
International Light Research Radiometer Model: IL 700A	International Light, Inc. 17 Graf Road Newburyport, MA 01950-4092 Phone: (508) 465-5923 FAX: (508) 462-0759	Recommendation Reference: Operation Manual Manual Date: Page:	Out of service No OEL compliance use allowed without calibration	Off-site vendor

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IV. Other Meters & Equipment

Meter	Manufacturer &Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
<p>Questemp 15</p> <p>Model: Area Heat Stress Monitor</p>	<p>Quest Technologies 510 Worthington Street Oconomowoc, WI 53066 Phone: (414) 567-9157 Phone: (800) 245-0779 FAX (414) 567-4047</p>	<p>Recommendation Reference: No Recommendation stated</p> <p>Operation Manual Manual Date: 11/97 Rev. C Page: 34</p>	Annual	<p>Off-site or IHG via water temperature bath and NIST thermometer for multiple point calibration</p>
<p>Questemp II</p> <p>Model: Personal Heat Stress Monitor</p>	<p>Quest Technologies 510 Worthington Street Oconomowoc, WI 53066 Phone: (414) 567-9157 Phone: (800) 245-0779 FAX (414) 567-4047</p>	<p>Recommendation Reference: Cal Probe for ear/environment differential (internal electronic equilibrate) before and after each use.</p> <p>Operation Manual Manual Date: 7/94 Rev. C Page: 11</p>	Annual	<p>Off-site or IHG via water temperature bath and NIST thermometer for multiple point calibration</p>
			Before and After each use	<p>Internal electronic equilibrate cycle in meter operation</p>

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V. Noise Meters

Meter	Manufacturer &Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
Noise Dosimeter Model: Quest M-27 Noise Dosimeter	Quest Electronics 510 Worthington Street Oconomowoc, WI 53066 Phone: (414) 567-9157 Phone: (800) 245-0779 FAX (414) 567-4047	Recommendation Reference: Yearly- factory check out Prior to use with Calibrator Operation Manual Manual Date: Page: 15/18	Annual	Off-site maintenance check and calibration
			Prior to and after each use	IHG field calibrator, single point at 1000 Hz, A-weighted
Sound Level Meter Model: GenRad 1565B	General Radio Quad Tech	Recommendation Reference: Use calibrator, frequency not stated Operation Manual Manual Date: 5/79 Page:	Annual	IHG field calibrator multiple frequency calibration Flat weighted, off-site vendor if fails
			Prior to and after each use	IHG field calibrator, single point at 1000 Hz A-weighted
Octave Band Analyzer Model: GenRad 1982	General Radio	Recommendation Reference: Sensitivity check before and after each use at 1kHz Operation Manual Manual Date: 1982-0100-D 1977 Page: 1-12	Annual	IHG field calibrator multiple frequency calibration Flat weighted, off-site vendor if fails
			Prior to and after each use	IHG field calibrator, single point at 1000 Hz A-weighted for SPL
			Prior to and after each use	IHG field calibrator, single point at 62- 4000 Hz for OBA
B&K Precision Integrating Sound Level Meter Model: Type 2236	Bruel & Kjaer Instruments, Inc. 185 Forest Street Marlborough, MA 01752-3093 Phone: (508) 481-7737 FAX (508) 624-0503	Recommendation Reference: No Recommendation stated Operation Manual Manual Date: Oct., 1993 Page: 7-1	Annual	IHG field calibrator multiple frequency calibration Flat weighted, off-site vendor if fails
			Prior to and after each use	IHG field calibrator, single point at 1000 Hz A-weighted for SPL
			Prior to and after each use	IHG field calibrator, single point at 62- 4000 Hz for OBA

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Meter	Manufacturer &Address/Phone	Manufacturer Calibration Frequency Recommendation	BNL Calibration Frequency Policy	BNL Calibration Mechanism
<p>GenRad Calibrator</p> <p>Model: GR1562-A</p>	<p>General Radio Quad Tech</p>	<p>Recommendation Reference: No recommended frequency</p> <p>Operation Manual Manual Date: 4/78 Page: 38</p>	<p>Annual</p>	<p>Off-site Vendor</p>
<p>B&K Calibrator</p> <p>Model: 4231</p>	<p>Bruel & Kjaer Instruments, Inc. 185 Forest Street Marlborough, MA 01752-3093 Phone: (508) 481-7737 FAX (508) 624-0503</p>	<p>Recommendation Reference: Annual as per ANSI S1.40</p> <p>Operation Manual Manual Date: 1/94 Page: 3-4</p>	<p>Annual</p>	<p>Off-site Vendor</p>