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FR1	Nonintent Changes to Remove From Bluesheet	All	12/11/2017
FR2	Revise to add forms to Records section.	All	2/28/19

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1.0 PURPOSE AND SCOPE

1.1 Purpose

The purpose of this procedure is to establish and maintain the Paducah Gaseous Diffusion Plant (PGDP) Deactivation and Remediation (D&R) Contractor Industrial Hygiene (IH) Measuring and Testing Equipment (M&TE) program. This program includes, but is not limited to, *equipment calibration* (see definitions) within the context of the best professional practice of IH.

NOTE:

Within the field of IH, the terms "calibration" and "performance verification" are commonly used interchangeably, although each term has a distinct technical definition. The "owner's manuals" for IH field M&TE devices commonly refer to frequent "calibration" tasks that should be more appropriately described as "performance verification" protocols. This procedure attempts to provide some clarification of this issue by choice of terms in specific contexts. Unfortunately, the miss-use of such terms in verbal communications remains common among professional health and safety practitioners. Therefore, care is warranted in the selection of terminology used in verbal and written communications regarding the IH M&TE program.

1.2 Scope

This procedure applies to the use, maintenance, and calibration of IH M&TE and establishes controls for the implementation of the IH M&TE Program at PGDP D&R Contractor in Paducah, Kentucky. M&TE equipment used for the purpose of measuring and/or assessing actual or potential exposures of plant personnel to actual or potential occupational exposure to chemicals or physical agents in the work environment must be calibrated as specified in this procedure; with the exception of instrumentation used for the measurement of ionizing radiation. Such instruments (ionizing radiation M&TE) are subject to a distinctly separate program and procedures.

Similarly, M&TE used onsite in the clinical diagnostic or emergency medical treatment environment are not within the scope of this procedure. Likewise, M&TE similar to IH M&TE, but assigned to and used by such emergency organizations as the Plant Shift Superintendent or PGDP Fire Department, are not regarded as "used for the purpose of measuring/accessing exposure agents in the work environment"; rather, the instruments are used as tools for initial screening to assist in rapidly characterizing emergency conditions. IH personnel respond to emergency incidents on site and provide the technical support for accessing potential occupational exposures.

The requirements of CP3-SM-0017, *Measurement and Test Equipment*, are not applicable to IH measuring and test equipment.

2.0 REFERENCES

2.1 Use References

- Applicable equipment operation manuals
- CP3-HS-2008, *Accident Prevention Equipment Control Tags*
- CP3-RD-0010, *Records Management Process*
- National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods, Volumes I and II, latest edition.
- Occupational Safety and Health Administration (OSHA) Chemical Sampling information (CSI)
- OSHA Technical Manual, latest edition.

2.2 Source References

- CP2-QA-1000, *Quality Assurance Program Description for the Paducah Gaseous Diffusion Plant, Paducah, Kentucky*
- CP3-CP-0002, *Acquisition Management*
- CP3-EN-0215, *Engineering Evaluations*
- CP3-QA-1001, *Graded Approach*
- CP3-QA-1003, *Management and Self Assessment*
- CP3-QA-1007, *Procurement Quality Assurance*
- CP3-QA-2005, *Nonconformance Control*
- CP3-QA-3001, *Issues Management*
- American National Standards Institute (ANSI)/National Conference Standards Institute (NCSI), Z540-1-1994, *Calibration Laboratories and Measuring and Test Equipment - General*
- American Society of Mechanical Engineers (ASME), NQA-1, *Quality Assurance Program Standard for Nuclear Facilities* (2008-2009 addendum)
- Instrument Society of America (ISA) RP-67.04, Part II, Methodologies for the Determination of Set Point for Nuclear Safety – Related Instrumentation – 1994
- International Vocabulary of Basic and General Terms in Metrology (VIM) ISO 1993
- Title 10 Code of Federal Regulations (CFR) § 830.122, *Nuclear Safety Management, Quality Assurance Requirements*

3.0 COMMITMENTS

None

4.0 RESPONSIBILITIES

4.1 Industrial Hygiene Manager

Designates an IH M&TE (see definition) Coordinator to implement and serve as the Subject Matter Expert (SME) for this program.

4.2 IH M&TE Coordinator

4.2.1 Provides and maintains a temperate location for the storage, maintenance and security of IH equipment. Temperate location is assumed to be a mechanically heated and cooled environment that provides stable temperature surroundings of 62°F to 82°F during all seasons of the calendar year.

4.2.2 Provides routine and periodic maintenance, repair and performance verification of IH equipment.

4.2.3 Ensures availability of an adequate inventory of third party-calibrated (factory, vendor) equipment for use.

4.2.4 Ensures equipment is sent off-site for factory (or vendor) calibration, when required.

4.2.5 Maintains a current inventory of IH M&TE, including current custodian/user, location, performance verification/calibration status, scheduled off-site calibration (if applicable) and in-service/out-of-service status.

4.2.6 Maintains an inventory of essential consumable supplies and spare parts to support the readiness of IH M&TE for routine use and planned emergency conditions.

4.2.7 Maintains an inventory of IH field sampling media to support the readiness of IH M&TE for routine use and planned emergency conditions.

4.2.8 Maintains a scheduled preventative maintenance and replacement plan for IH equipment in use and, at least annually, provides recommendations for equipment additions/replacements based on changing technologies impacting IH M&TE as used in the professional practice of IH.

4.2.9 Affixes performance verification stickers on equipment, when appropriate.

NOTE:

Performance verification stickers do not need to be directly affixed to equipment in routine use (i.e., daily), provided supporting data exists in log books, field survey notes, or similar routinely maintained documentation that can readily provide traceability/ tractability of the use of the equipment should a pre-use check indicate previous data may require verification or replication. Performance verification checks must be performed no less than twice per shift, prior to first and after last use.

4.2.10 Ensures factory-calibrated equipment has calibration stickers affixed, as appropriate.

4.3 Field IH Personnel

4.3.1 Ensures daily verification of performance verification and/or calibration of IH M&TE prior to use. Under off-normal operating conditions (such as overtime work, emergencies, or the absence of the IH M&TE Coordinator) performs the duties of the IH M&TE Coordinator as required to execute essential work.

4.3.2 Ensures field user data entries are made in the IH M&TE database, as required.

4.3.3 Ensures IH M&TE is stored, when not in use, in a location that is a mechanically heated and cooled environment that provides stable temperature surroundings of 62°F to 82°F during all seasons of the calendar year.

4.3.4 IH M&TE must be operated according to manufacturer's directions. Manufactures' recommendations for storage and operating use are to be strictly followed; however, in the absence of specific manufacturer's criteria, IH M&TE may not be stored or used below 32°F or above 100°F, ambient dry bulb without the prior concurrence of the Manager, IH or designee.

5.0 GENERAL INFORMATION

5.1 The IH M&TE Program is implemented for performance verification processes by instrument users (internal) and for calibration processes performed by (external) primary standard calibration organizations (manufacturers/service vendors).

5.2 IH M&TE is entered into a computer-based inventory and maintenance/use status program for equipment that is factory-calibrated, performance verified, and/or repaired by the IH M&TE Coordinator (IH M&TE Subject Matter Expert) or designee, or forwarded to the manufacturer for certification and repair. The database shall list IH M&TE identifiers, including serial numbers owned/operated by PGDP D&R Contractor, and dates of at least the most recent and next scheduled performance verification and calibration due dates. The project IH Manager is responsible for assigning an individual to be responsible for maintaining the database; typically that person will be the IH M&TE Coordinator. Equipment in the computer-based inventory and maintenance program is recalled by written notification (e-mail) to the instrument equipment custodian or their technical support group lead.

5.3 IH internal performance verifications are conducted and authenticated by the IH M&TE Coordinator, or designee based on equipment type, manufacturer instructions, and generally accepted IH practice. External IH calibrations shall be performed by the manufacturer or a manufacturer-approved vendor.

5.4 Equipment, for which performance documents for calibration and operation have not been written, shall be used according to the requirements of the Occupational Safety and Health Administration Chemical Sampling Information (OSHA CSI), National Institute for Occupational Safety and Health (NIOSH) Manual of Analytical Methods, OSHA Technical Manual, or written instructions provided by the manufacturer.

5.5 Performance verification/calibration information shall be recorded in the IH Performance Verification/Calibration Logbooks for Direct Reading Instruments. Performance verifications for integrated air sampling pumps shall be recorded on the applicable data entry forms.

5.6 Internal performance verification records for direct reading instruments shall include the equipment ID, user's name (or identifier such as badge number), date, pre-use performance verification values, post use performance verification values, and limits as applicable. These records shall be maintained in the IH Performance Verification/Calibration logbooks for Direct Reading Instruments. The notebook record shall be maintained in a secure location. This location must meet the requirements as a quality records storage location according to CP3-RD-0010, *Records Management Process.*

5.7 When entering /recording IH performance verification and calibration data, performer shall assure completeness of entry in each data field; when data entry is not appropriate, clearly indicate why the entry was not made (NR=not required; NA=not available; void; etc.). Do not leave data fields blank (without entry or notation).

6.0 INSTRUCTIONS

6.1 IH M&TE Control and Performance Verification/Calibration

Subject Matter Expert or Designee

6.1.1 Keep the IH M&TE equipment in good working order and properly maintained. M&TE equipment requiring factory calibration must have a current calibration that is traceable to a National Institute of Standards and Technology (NIST) reference standard.

6.1.2 Ensure external calibrations are conducted according to written instructions provided by the manufacturer and traceable to NIST standards. Receiving a NIST traceable Certificate of Calibration from the vendor will ensure this.

6.1.3 Perform user-level M&TE performance verifications according to the requirements of the OSHA CSI, NIOSH MAM, OSHA Technical Manual, written operator instructions provided by the manufacturer, or other appropriate reference (See Section **2.0**).

6.1.4 Uniquely identify the individual conducting the performance verification.

6.1.5 Perform user-level performance verifications using calibrators that are factory-calibrated to a NIST-traceable standard documented with a Certificate of Calibration.

6.1.6 Schedule external calibration due dates of like instruments at staggered increments throughout the year so that field support capabilities are not negatively impacted while instruments are being calibrated off-site.

6.1.7 Schedule external calibrations of seasonal use instruments, such as heat stress monitors, during off-demand periods.

6.1.8 Ensure that equipment, **NOT** in satisfactory working condition, is **NOT** inadvertently used by performing the following:

- Remove immediately from service
- Segregate from “in-service” equipment, as appropriate
- Tag the equipment, using defective equipment tags according to CP3-HS-2008, *Accident Prevention Equipment Control Tags,* or other equally effective means
- Send to the equipment custodian or vendor for repair.

6.1.9 Keep user-level performance verification gases and supplies ordered, in stock, and within their current shelf-life or expiration period.

6.1.10 Record performance verifications (pre and post) conducted by IH, including results for instruments being removed from service, in the appropriate performance verification on the applicable data entry form. This will be considered as a record.

6.1.11 **If** an instrument is **NOT** used after pre-use performance verification, **then** post-use calibration is **NOT** required; however, it should be noted as “**NOT** used” or other appropriate comment on the applicable data entry form.

6.1.12 Properly pack **and** ship IH M&TE due for external calibration to the appropriate manufacturer or manufacturer-approved vendor. Include all attachments and/or other parts necessary to perform the external calibration with the equipment.

6.1.13 Review documentation received from manufacturer or other outside calibration laboratories for instrument information.

NOTE:

All externally calibrated M&TE returned from the manufacturer, or a third party service vendor, should have appropriate Certificate of Calibration documentation available in a retrievable manner, **and** labels affixed on the instrument with calibration date and due date information. The Manufacturer's or vendor's information may be transferred to PGDP D&R Contractor furnished labels provided the transcribed data may be found in other forms of documentation such as laboratory reports, test data report, shipping orders, or receipt acceptance lists. This level of documentation is not required for routine performance verification.

6.1.14 Document a history of use for any instrument recorded to be out of tolerance "as found" by the outside calibrator.

6.1.15 Check the incoming M&TE to be sure that it is in good operating (for example, battery charged, IH calibration) condition.

6.2 Pre-Operational Verification

<u>IH SME or Designee</u>

6.2.1 Prior to use of IH M&TE, perform a pre-operational check according to written operator instructions provided by the manufacturer, OSHA CSI, NIOSH, or OSHA Technical Manual to verify that the instrument is working properly.

6.2.2 **If** the results of the pre-operational check are unacceptable, **then** refer to Step **6.1.8**.

7.0 RECORDS

7.1 Records Generated

The following records may be generated by this procedure:

- CP3-HS-2038-F01, *Industrial Hygiene Equipment/Instrument Log*
- CP3-HS-2038-F02, *IH Direct Reading Gas Monitoring Instrument Pre and Post-Use Performance Verification or Calibration Form for _____ Instruments*
- CP3-HS-2038-F03, *Industrial Hygiene Calibrator Leak Test Form*
- CP3-HS-2038-F04, *Industrial Hygiene Air Sampling Pumps Calibration Form (low & high flow)*
- CP3-HS-2038-F05, *Industrial Hygiene Sound Level Meter & Noise Dosimetry Pre & Post-Use Performance Verification Form*
- CP3-HS-2038-F06, *Industrial Hygiene Jerome Mercury Vapor Analyzer Pre Use Performance Verification Form*

7.2 Records Disposition

The records are to be maintained according to CP3-RD-0010, *Records Management Process*.

Appendix A – Acronyms/Definitions

ACRONYMS

ANSI – American National Standards Institute

ASME – American Society of Mechanical Engineers

CFR – Code of Federal Regulations

CSI – Chemical Sampling Information

D&R – Deactivation and Remediation

IH – Industrial Hygiene

ISA – Instrument Society of America

M&TE – Measuring and Test Equipment

NCSI – National Conference Standard Institute

NIOSH – National Institute for Occupational Safety and Health

NIST – National Institute of Standards and Technology

OSHA – Occupational Safety and Health Administration

PGDP – Paducah Gaseous Diffusion Plant

QL – Quality Level

SME – Subject Matter Expert

SSCs – Structures, Systems, and Components

VIM – International Vocabulary of Basic and General Terms in Metrology

DEFINITIONS

CALIBRATION – Comparison of M&TE or measurement standards with specified tolerance (but of unknown accuracy) to a nationally recognized measurement standard system of specified capability and of known uncertainty to detect, correlate, report, or minimized by adjustment or correction factor all deviation from specified tolerance limit. Includes external cleaning and minor adjustments and production or revision of correlation charts, tables, or software when necessary to meet specified tolerances.

CALIBRATION FACILITY(S) – Shop/Lab where factory-calibrated M&TE is maintained and stored.

Appendix A – Acronyms/Definitions (Continued)

MEASUREMENT AND TEST EQUIPMENT (M&TE) – Devices or systems used to calibrate, measure, gage, test and inspect in order to control or acquire data to verify conformance to specified quality requirements. For the applicability of this procedure, M&TE refers to measuring instruments (generally portable), measurement standards, traceable standard reference materials, and/or auxiliary apparatus used in the course of testing, inspecting, verifying performance, and/or calibrating for the purpose of establishing operability or functionality of Quality Level (QL) -1, QL-2, or QL-3 structures, systems, and components (SSCs). The physical characteristics by measurement performed in this discipline include voltage, current, temperature, impedance, force, acceleration, optics, mass (weight), length, roughness, and others. It does not apply to equipment such as rulers, tape measures, non-precision levels, dial indicators, and other such devices if commercial equipment provides adequate accuracy. On a practical basis, IH M&TE is typically QL-3.

PERFORMANCE VERIFICATION – An internal evaluation of an instrument's performance at a single point on the factory calibration curve, used to ensure the instrument is still functioning on the factory calibration curve.