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Revision History

The top row of this table shows the most recent changes to this controlled document. For previous revision history information, archived versions of this document are maintained by the SESD Document Control Coordinator on the SESD local area network (LAN).

History	Effective Date
<p>SESDPROC-108-R5, <i>Equipment Inventory and Management</i>, replaces SESDPROC-108-R4.</p> <p>Cover Page: Changes made to reflect reorganization of SESD from two field branches to one: John Deatruck listed as the Chief, Field Services Branch. The FQM was changed from Bobby Lewis to Hunter Johnson.</p> <p>Revision History: Changes were made to reflect the current practice of only including the most recent changes in the revision history.</p> <p>Section 2.2.2: The following language was added: “Before being placed into service, field equipment must be verified by a qualified individual. The verification process can be conducted by first calibrating the equipment, then checking the equipment against a known standard. Personnel may also choose to compare measurement values of the new equipment to currently utilized equipment to further document the verification. Once completed, the verification documentation must be provided to the BFEM to be stored with the equipment records.”</p>	August 13, 2015
<p>SESDPROC-108-R4, <i>Equipment Inventory and Management</i>, replaces SESDPROC-108-R3.</p>	February 6, 2013
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<p>SESDPROC-108-R1, <i>Equipment Inventory and Management</i>, replaces SESDPROC-108-R0.</p>	October 1, 2007
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1 General Information

1.1 Purpose

This document describes the procedures necessary to demonstrate the operational status and inventory of equipment used for field measurement activities and equipment that comes into direct contact with the sample media and has the potential to cross contaminate samples between sampling stations.

1.2 Scope/Application

This procedure covers the approaches and documentation used for the purchase, maintenance, calibration, verification and inventory of equipment used for direct field measurement activities. This procedure includes the maintenance and use of microscopes, volumetric equipment and equipment that may come into direct contact with the sample media (i.e. submersible pumps) and has the potential to cross contaminate samples between sampling stations. Mention of trade names or commercial products in this operating procedure does not constitute endorsement or recommendation for use.

1.3 Documentation/Verification

This procedure was prepared by persons deemed technically competent by SESD management, based on their knowledge, skills and abilities and has been tested in practice and reviewed in print by a subject matter expert. The official copy of this procedure resides on the SESD Local Area Network (LAN). The Document Control Coordinator (DCC) is responsible for ensuring the most recent version of the procedure is placed on the LAN and for maintaining records of review conducted prior to its issuance.

1.4 Definitions

1.4.1 Calibration

The set of operations which establish, under specified conditions, the relationship between values indicated by a measuring instrument or measuring system and corresponding known values. The results of a calibration permit the estimation of errors associated with the measurement equipment.

1.4.2 Calibration Verification

Provides a means of determining that deviations between measured values and known values are within the limits of error defined during calibration. The results provide an indication that the instrument/system is working properly.

1.4.3 Preventative Maintenance

A program of routine actions such as cleaning, lubrication, adjusting, or testing to keep equipment ready for use. The most important effect of a preventative maintenance program is to ensure measurement system reliability.

1.4.4 Branch Field Equipment Manager

Staff, designated by management, who are responsible for ensuring that the procedures for Equipment Inventory and Management are followed.

1.4.5 Qualified Individual

Individual who has received on the job training and has experience working with specific measurement instruments.

1.4.6 Equipment Log

Notebook, log book or electronic file that contains a copy of the purchase order, if available, as well as, maintenance, calibration, verification records, performance checks, correction factors and sign-out/sign-in records. Equipment logs will be established for all equipment used for field measurement activities or equipment that comes into direct contact with the sample media and has the potential to cross contaminate samples between sampling stations. The development of equipment logs is the responsibility of the Branch Field Equipment Managers.

1.4.7 SESD Field Equipment Tracking System

Electronic database used to sign-out/sign-in sampling equipment, track equipment use history, and maintain equipment availability status.

1.5 Precautions

To ensure the safe and reliable operation of equipment, the manufacturers' directions for transport, cleaning, decontamination, storage, maintenance and operation of equipment will be followed. When possible, a copy of the instruction manual will be provided with sampling equipment to be taken in the field. In addition, field activities will be conducted

in accordance to the SESD Safety, Health and Environmental Management Program (SHEMP).

Handling of contaminated equipment is addressed under the following operating procedures: Field Equipment Cleaning and Decontamination at the Field Equipment Center (SESDPROC-206) and Field Equipment Cleaning and Decontamination (SESDPROC-205).

1.6 References

American National Standard ANSI/ASQC M1-1996, *Calibration Systems*

American National Standard ANSI/NCLZ Z2540-1-1994, *Calibration Laboratories, and Measuring and Test Equipment - General Requirements*

SESD Safety, Health and Environmental Management Program (SHEMP) Manual, most recent version.

SESD Operating Procedure for Field Equipment Cleaning and Decontamination, SESDPROC-205, most recent version.

SESD Operating Procedure for Field Equipment Cleaning and Decontamination at the FEC, SESDPROC-206, most recent version.

SESD Operating Procedure for Competency and Proficiency Testing, SESDPROC-006, most recent version.

SESD Operating Procedure for Purchasing of Services and Supplies, SESDPROC-015, most recent version.

SESD Operating Procedure for Control of Nonconforming Work, SESDPROC-019, most recent version.

FEC Loan-In Form, SESDFORM-011, most recent version.

Analytical Support Branch Standard Operating Procedure for the Certification of Laboratory Thermometers, SOP ASB 100G.

2 Methodology

2.1 General

Equipment (hardware and related software) used for field measurement activities and equipment that comes into direct contact with the sample media and has the potential to cross contaminate samples between sampling stations will meet quality requirements identified for each piece of equipment. Important factors in establishing quality requirements include the parameters to be measured and the sensitivity and specificity of the detection system used. Quality requirements must include ensuring that equipment is ready for use. Specifically:

1. SESD will have adequate equipment to conduct measurement activities.
2. Equipment used for field measurement activities will be capable of achieving the accuracy and precision required by the measurement objectives.
3. When SESD is required to use environmental data collection equipment outside its permanent control, it will ensure that all relevant SESD criteria in this procedure are met.
4. Field measurement equipment used by SESD will be secured at all times, as feasible, based on field conditions.
5. Operating instructions and/or manuals from the manufacturer will be available for each piece of equipment, when possible.
6. Field investigators will only operate equipment for procedures which they are authorized per SESDPROC-006 to perform.
7. Equipment used for field measurements will be handled, transported, shipped, stored and operated in a manner that prevents damage, gross contamination and deterioration. Equipment will be handled and maintained in accordance to the manufacturer's operating instructions. Decontamination of equipment will be in accordance to procedures described in the SESD Operating Procedure for Field Equipment Cleaning and Decontamination (SESDPROC-205) and Field Equipment Cleaning and Decontamination at the FEC (SESDPROC-206).

2.2 Equipment Purchase and Receipt

2.2.1 Purchasing Equipment

Equipment covered in this procedure is purchased using procurement requests (PR) or purchase card orders and can be initiated by the BFEM or designee. The initiator of a purchase is responsible for preparing a PR or purchase card order that specifies the correct name of the item, the relevant quality criteria of the item, the item number, a quote or price, possible sources and any other associated information that helps identify the correct item to be purchased. The sources identified must be capable of providing the equipment according to the defined specifications. A copy of the purchase order or purchase card order will be maintained in the equipment log. Once the order has been prepared, the information is forwarded to the appropriate BFEM for origination of the purchase and management will authorize and sign the order and forward it to the purchasing official. The purchasing official will ensure the order is processed according to the information on the PR or purchase card order.

2.2.2 Receiving Equipment

Anyone can accept delivery of equipment orders. For equipment purchases received at the SESD laboratory, the BFEM or initiator of the purchase will inspect the items to ensure they comply with the PR or purchase card order. If the items are acceptable, the BFEM or initiator will sign and date the invoice that accompanied the order and any other required documentation and forward it to the purchasing official. The purchasing official will maintain a file of all SESD purchases.

For purchases received at the Field Equipment Center, contract personnel will inspect the items to ensure they comply with the PR or purchase card order. If the items are acceptable, the contract personnel will sign and date the invoice that accompanied the order and any other required documentation and forward it to the appropriate BFEM. The original paperwork (signed invoice) will be forwarded to the purchasing official.

Before being placed into service, field equipment must be verified by a qualified individual. The verification process can be conducted by first calibrating the equipment, then checking the equipment against a known standard. Personnel may also choose to compare measurement values of the new equipment to currently utilized equipment to further document the verification. Once completed, the verification documentation must be provided to the BFEM to be stored with the equipment records.

If any equipment is found to be unsuitable for use, the BFEMs will document the problems and any action taken to correct that problem. The documentation will

include a description of the item, the deficiency and the vendor. The BFEM will also compile all occurrences of unsuitable consumables, supplies or services and determine what further corrective action may be necessary and notify the Field Quality Manager if deemed necessary.

2.3 Equipment Inventory

2.3.1 Inventory

The BFEMs are responsible for maintaining a current equipment inventory list for their specific areas. The BFEMs will maintain a central, comprehensive list of all field measurement and sampling equipment subject to this procedure. Field measurement equipment, including sampling equipment that comes into contact with the sample media and has the potential to cross contaminate samples between stations (i.e., submersible pumps and vacuum chambers), will be included in this inventory. The equipment inventory list for each instrument or piece of equipment will include:

1. A description of the property and software, if applicable (e.g., pH meter, dissolved oxygen meter, etc.).
2. Manufacturer or vendor name
3. Model number
4. Serial number or other manufacturer identification number
5. A unique identifier, known as the SESD ID Number. These identifiers will be assigned by the BFEM.
6. Storage location (e.g., Field Equipment Center, SESD Laboratory)
7. Date received and/or date placed in service, where available.
8. Status of the equipment (e.g., surplus, damaged, etc.)
9. A reference to the manufacturer's instruction manual title.

2.3.2 Equipment Labeling and Marking

Prior to being placed into the equipment inventory, all equipment covered under this procedure will be inventoried and labeled with a unique SESD identification number. The identification number will be assigned only to the identified equipment and will not be reused if the meter is excised or disposed. Equipment that is no longer used or cannot be repaired will be removed from the inventory.

Equipment received after the effective date of this procedure will be assigned a number that includes the date the equipment was received followed by a sequential number starting at 01 (e.g., 031407-01, 031407-02, etc.). BFEMS will ensure that duplicate SESD ID Numbers are not assigned to equipment.

Equipment received before the effective date of this operating procedure will be assigned a number that will incorporate all or part of the serial number or other manufacturer number as the unique SESD ID number.

2.4 Equipment Maintenance

Maintenance will consist of preventative care and corrective repair. Both approaches should be used to keep equipment in working order. Each item of field measurement equipment will be checked by a qualified individual prior to use. Critical spare parts, which cannot be easily obtained while in the field, will be sent out with the equipment during field investigations.

Equipment maintenance will include software upgrades for certain instruments. SESD management will assign staff to serve as a point of contact for equipment, such as GPS or Sondes that may require periodic software upgrades in order to collect field measurements. The point of contact will ensure that software upgrades are conducted on all equipment. The point of contacts will maintain a list of the equipment which will include the serial number, SESD ID Number, software version, software upgrade dates and the storage location of the equipment. The point of contact will provide the information to the appropriate BFEM to be included in the equipment inventory.

2.4.1 Documentation

The BFEMs are responsible for the development of equipment logs. Maintenance, calibration and verification requirements for equipment will be documented in the SESD Field Equipment Tracking System or equipment log.

2.4.2 Repair and Re-certification for Use

Equipment known or suspected to be defective will be taken out of service and clearly labeled, preferably with a red tag, until it has been repaired and shown by calibration, verification or testing to function properly. When equipment is tagged in the field as defective, the SESD project leader will notify the appropriate BFEM in writing, either by email or by using a load-in form (SESDFORM-011), that equipment requires repair.

For equipment maintained at the FEC which is routinely handled and maintained by contract personnel, the BFEM will be responsible for having the equipment repaired. Once repaired, the BFEM will notify the FEC contract personnel that the equipment has been returned. The contract personnel will ensure that the equipment is functioning properly prior to it being used for field investigations. The BFEMs are responsible for placing all documentation associated with the equipment repair in the SESD Field Equipment Tracking System or appropriate

maintenance section of the equipment log. This documentation includes written notifications regarding the equipment repair and any information provided from the manufacturer which describes the defect and the repair.

For equipment stored at the SESD laboratory, or stored at the FEC and not routinely handled and maintained by contract personnel, the BFEM or a designated qualified individual will be responsible for having the equipment repaired. Once repaired, the BFEM or qualified individual will ensure the equipment is functioning properly prior to it being used for field investigations. The BFEM or qualified individual is responsible for placing all documentation associated with the repair of equipment stored at the SESD laboratory in the SESD Field Equipment Tracking System or appropriate maintenance section of the equipment log. This documentation includes the written notifications regarding the equipment repair and any information provided which describes the defect and the repair.

If there is the potential that data collected with defective equipment were adversely impacted, the BFEM will notify the appropriate Branch Quality Assurance Officer (QAO). The QAO will notify affected management and The Field Quality Manager and the issue will be handled according to the SESD Operating Procedure for Control of Nonconforming Work (SESDPROC-019).

2.4.3 Required Maintenance

The BFEMs are responsible for ensuring that equipment maintenance is performed in-house or by an outside service.

2.4.4 Record Keeping

Records of all maintenance, service, repairs and histories of any damage, malfunction or modification of field measurement equipment will be maintained in the equipment logs. The record will describe hardware and software changes and/or updates and show the dates when these occurred.

2.5 Equipment Calibration

Prior to being used in the field, measurement equipment will be visually inspected and a calibration, calibration verification or performance check will be conducted to ensure it is in working condition. A post-operation instrument verification check will be performed using the appropriate standard(s) at the end of the day or after all measurements have been taken for a particular period of operation. When practicable, equipment requiring calibration will be labeled to indicate the status of calibration and the date when re-calibration is due. Calibration acceptance criteria based on data quality objectives will be established on a case by case basis for each field study. Project Leaders will be responsible

for ensuring the acceptance criteria are met. Calibration and measurement requirements are found in individual measurement procedures.

When equipment or reference standards are calibrated by an outside calibration service, SESD will ensure the vendor is ISO 17025 accredited or has some other equivalent means for demonstrating competence, measurement capability and traceability.

All reasonable measures will be taken to safeguard equipment from adjustments which would invalidate the measurements following calibration of the equipment. Field investigators will handle, transport and store equipment in accordance to manufacturer recommendations. Periodic calibration or performance checks will be conducted during field investigations to ensure that equipment calibration has not been adversely impacted between measurement locations.

For equipment that is not directly used for field measurement, visual examination, safety checks or, if appropriate, performance checks, will be conducted by the FEC contract personnel or the project leader to ensure the working condition of the equipment. Microscopes, including attachments, will be cleaned and serviced as needed prior to use.

Volumetric equipment will be maintained by visual examination and cleaning at the Field Equipment Center. Performance checks will be conducted by the FEC contract personnel or the project leader prior to initial use and at intervals depending on the frequency of use.

2.5.1 Documentation

Records for equipment that is sent off-site for calibration recertification will be maintained in the equipment log books. All calibrations or calibration verifications performed at the SESD laboratory or Field Equipment Center will be recorded in the SESD Field Equipment Tracking System or appropriate equipment log.

All calibrations or calibration verifications performed in the field will be recorded in the project specific logbook(s) by the individual conducting the calibration or verification and stored in the associated project file. Calibration of equipment conducted by SESD field investigators and other qualified personnel will be conducted in accordance with the manufacturer's recommendations

When calibrations require correction factors, the correction factors will be documented in instrument operating procedures, equipment logs and written methods (field logbooks).

2.5.2 Traceability, Certification, and Verification Records

The program for the calibration or calibration verification of equipment must ensure that, where the concept is applicable, all significant measurements are traceable

through certificates of calibration held by SESD, and/or to National Standards of Measurement. National Institute of Standards and Technology (NIST) traceable standards will be used, if available. For equipment maintained at the FEC and sent off-site for calibration, certificates or other records of calibration will be maintained in a central file at the FEC. Additionally, NIST traceable documentation for buffers, standards, calibration gases or reference materials will be maintained in a central file at the FEC.

For equipment maintained at the SESD laboratory and sent off-site for calibration certificates or other records of calibration will be maintained in the lab where the equipment is stored. Additionally, NIST traceable documentation for buffers, standards, calibration gases or reference materials will be maintained in a central file at the SESD laboratory with the equipment.

SESD will maintain records of actions taken to verify the quality of equipment whose properties could affect the quality of sampling, measurement and related activities. Examples would be thermometer, calibration standard or buffer verification. Thermometers used during field investigations will be verified by the SESD Analytical Support Branch (ASB) or EPA contract personnel utilizing the ASB Standard Operating Procedure for the Certification of Laboratory Thermometers, SOP ASB 100G. The SESD ASB is accredited by the National Environmental Laboratory Accreditation Conference.

Critical reference materials such as reagents and consumable materials that affect the quality of tests and/or calibrations will be verified according to the procedures described in the SESD Operating Procedure for Purchasing Services and Supplies, SESDPROC-015.

2.5.3 Equipment Performance Checks

New equipment will be calibrated or verified by qualified personnel to verify that it is adequate to perform its intended function, and calibrated before release for use in the field. Records of calibration or verification will be maintained in the equipment log books. If any equipment proves to be unsuitable for use, the BFEMs will document the issue, notify the purchasing official and return the deficient equipment to the vendor.

If equipment leaves the direct control of SESD for a period of time, the BFEMs will ensure that the function and, where necessary, the calibration status of the equipment is checked and shown to be satisfactory before the equipment is returned to service.

2.6 Records

The BFEMs are responsible for maintaining a current equipment inventory list for their specific programs. The FQM will maintain a central, comprehensive list of all field measurement and sampling equipment subject to this procedure.

The BFEMs are responsible for creating equipment logs for all equipment in their specific program used for field measurement activities. Additionally, they are responsible for auditing and maintaining equipment maintenance, calibration and verification records in the equipment logs. These records must be made available to SESD personnel prior to their use for field measurement.

These records will include:

1. A copy of the Purchase Order, if available, or other record showing item received and date placed into service
2. Acceptance inspection record of the equipment (copy of signed invoice)
3. Maintenance, calibration and verification logs (including software if applicable)
4. Identification of individuals accessing maintenance, calibration and verification logs
5. Calibration certificates for manufacturers calibrations (if applicable)
6. Fundamental calibration or any other performance checks information
7. Calibration verification record (showing standards/reference materials used)
8. Calibration correction factors, if applicable
9. Records of handling, transportation and storage of equipment
10. Complaint log (if applicable)
11. A record of the most recent version of firmware or software for the equipment.

2.7 Equipment Sign-out/Sign-in

All measurement equipment will be signed-out prior to use in the field and signed-in following use in the field. This will be done using the SESD Field Equipment Tracking System or by using an equipment sign-out/sign-in form. Each form is specific to the type of measuring equipment being checked out and includes calibration or verification data, as well as, project name and project leader information.

FEC contract personnel will primarily be responsible for equipment sign-out and sign-in at the FEC. However, in their absence, it is the project leader's responsibility to sign out the measurement equipment. For measurement equipment that is not routinely handled or maintained by contract personnel or equipment stored at the SESD laboratory, the project leader or field investigator using the equipment is responsible for checking the equipment out and in.

Each equipment log will contain an equipment sign-out/sign-in form. Equipment defects or damage that is identified while in the field should be noted on the FEC Load-In Form (SESD FORM-011) when the equipment is signed in.