Forest Service Handbook
National Headquarters - Washington Office
Washington, DC

Forest Service Handbook 4090.13 – Good Laboratory Practices Handbook
Chapter 50 – Facility Operation

Amendment: 4090.13-93-1

Effective date: November 10, 1993

Duration: This amendment is effective until superseded or removed.

Approved by: David G. Unger, Acting Chief

Date approved:

Responsible Staff:

Last Change:

Superseded Document(s):

POSTING NOTICE. Amendments are numbered consecutively by Handbook number and calendar year. Post document in numerical order of chapters (1109.12, sec. 4.32, ex. 01). Remove entire national text of the Handbook and replace with this amendment. DO NOT REMOVE SUPPLEMENTS OR INTERIM DIRECTIVES. Retain this transmittal as the first page of this document.

Digest: Following is an explanation of the changes throughout the directive by section.

This Handbook provides direction on the principles and requirements of Good Laboratory Practice (GLPs) for Forest Service management and technical personnel. Any study that is performed with the intention of submitting the data to the U.S. Environmental Protection Agency or the U.S. Food and Drug Administration in support of a research or marketing permit must follow GLP standards.

01 - 06.5: Sets forth Authority (sec. 01), Policy (sec. 03), Responsibility (sec. 04), Definitions (sec. 05), and References (sec. 06) in the zero code chapter for the new Handbook on Good Laboratory Practices.

11 - 12.4: Establishes a new chapter that provides direction on the applicability of Good Laboratory Practices (GLPs) (sec. 11) and aspects of compliance (sec. 12).

20.3 - 22: Establishes a new chapter that provides direction on staffing requirements and training for personnel conducting, or involved with, Good Laboratory Practices.

30.3 - 35: Establishes a new chapter that provides policy and direction to determine requirements for test system care facilities (sec. 31); test system supply facilities (sec. 32); facilities for handling test, control, and reference substances (sec. 33); laboratory facilities (sec. 34); and archiving facilities (sec. 35) where Good Laboratory Practices are conducted or stored.

40.3 - 42.3: Establishes a new chapter that provides direction on equipment requirements including equipment design (sec. 41) and calibration and maintenance (sec. 42) for studies complying with Good Laboratory Practices.

50.3 - 55.33: Establishes a new chapter that provides direction on facility operations required for Good Laboratory Practices, including preparation of master schedule (sec. 51); standard operating procedures (sec. 52); reagents and solutions (sec. 53); test system care (sec. 54); and characterization, handling, and mixing with carriers of test, control, and reference substances (sec. 55).

61 - 62.32: Establishes a new chapter that provides direction on the preparation of protocols and collection of raw data for Good Laboratory Practices.

70.4 - 73.3: Establishes a new chapter, Records, Reports, and Archiving that provides direction on reporting study results (sec. 71), archiving (sec. 72).

80.1 - 81.2: Establishes a new chapter that provides direction on the requirements and duties of local and national Quality Assurance Units in support of Good Laboratory Practices.

90.1 - 93.38: Establishes a new chapter that provides direction on inspections conducted by local and national Quality Assurance Units (sec. 91 and 92) and the U.S. Environmental Protection Agency (sec. 93) in conjunction with Good Laboratory Practices.

This Handbook is now available electronically in the National Information Center in the same format as the paper copy. Henceforth, amendments to this Handbook will be issued to Forest Service units electronically on a document basis.

Table of Contents

50.3 - Policy

1. Develop Standard Operating Procedures for each facility tailored to the studies conducted and the equipment available there. Individual laboratories may supplement or modify Station or Regional SOPs in order to accurately describe current procedures. Follow the guidelines in this Handbook to develop acceptable SOPs.

2. Update components of the master schedule (sec. 51.1) as soon as changes occur to ensure that it is current at all times.

51 - Master Schedule

(Sec. 01, ex. 01; 40 CFR 160.35). Each facility must maintain a master schedule which lists all Good Laboratory Practice studies currently being conducted by the facility. The Quality Assurance Unit and the U.S. Environmental Protection Agency use the master schedule to assess the current workload and to determine whether there are adequate facilities and personnel available to complete all studies. The master schedule is not considered raw data but must be retained in the archives (sec. 72.1 and 73).

51.04 - Responsibility

It is the responsibility of line officers to ensure that the master schedule is updated and to determine how this is accomplished. For example, each Study Director could be given responsibility for keeping the status of their studies current on the master schedule.

51.1 - Contents

Include the following information for each study:

1. Test substance.

2. Test system.

3. Nature of the study.

4. Initiation date.

5. Current status.

6. Sponsor.

7. Study Director.

8. Quality Assurance Officer.

51.2 - Updates

Keep the master schedule current (sec. 50.3) on a computer or as hard copy (sec. 51.04). The Quality Assurance Unit must have a current copy of the master schedule.

52 - Standard Operating Procedures for Overall Operations

(Sec. 01, ex. 01; 40 CFR 160.81). Prepare written Standard Operating Procedures (SOPs) for all aspects of laboratory and field operations early in the implementation of Good Laboratory Practices (GLPs). Maintain well-written, accurate, up-to-date SOPs in order to comply with GLPs; inadequate or outdated SOPs are one of the most common areas of noncompliance detected during U.S. Environmental Protection Agency inspections (sec. 93). Ensure the quality and integrity of data generated during a study by developing a set of good SOPs.

Keep SOPs separate from protocols and study plans. Write SOPs with enough detail and clarity that a technically competent person can accurately reproduce the procedure without deviation. At the same time, write with enough latitude so that the SOPs do not have to be constantly updated. Require an SOP for every routine procedure of the laboratory which is not specified by a protocol. The SOPs should be written by personnel who perform the procedures and should be reviewed by other technical or professional personnel (peer review), the Study Director, and members of the Quality Assurance Unit before being submitted to management for approval. Make SOPs readily available to all who use or inspect them.

52.1 - Format

(For examples of SOPs, see sec. 52.11, ex. 01 - 03.) Follow a standard, consistent format which includes the following information:

1. Title. Identify the name of the project or the study. Include the name of the author and the laboratory where the Standard Operating Procedure (SOP) was authorized if it was written for a particular area or unit. The name or number of the study for which the SOP was implemented can also be included.

2. Identifying number. Develop a coding system that allows unique, systematized numbering and identification of updated versions of the SOPs. Include the revision number in the numbering system. See exhibit 01, paragraph 2.0 Numbering System, for a suggested means of developing a unique SOP identification number.

3. Effective date. Include the date that the SOP is distributed.

4. Review dates and date of next review. Review the SOPs annually to determine whether revision is needed as procedures change. The U.S. Environmental Protection Agency

(EPA) inspectors check SOPs for both currency and accuracy. List actions taken at each review; for example, whether the SOP was revised or accepted without revision.

5. Titles of approving officials. Ensure that the SOPs are adequately reviewed before they are submitted to station management for approval. Quality Assurance Unit (QAU) personnel especially should review SOPs and ensure that each SOP is properly written and that the proper SOP number is assigned.

6. Cover sheet. Each SOP may have a separate cover sheet that includes all of the information described in paragraphs 1-5, including approvals, review dates, and actions taken for review.

7. Purpose of the Standard Operating Procedure. State the purpose of the SOP. Describe the procedure or piece of equipment for which the SOP was written.

8. Scope. State the scope of the SOP; for example, whether it is used in all areas of a testing facility or its use is restricted to certain units or sections, such as archiving or the QAU.

9. Definitions. Define any specialized terms used in the SOP.

10. Text. Describe the procedures, processes, materials, transformations, or calculations covered in the SOP. Include provisions for health and safety, such as procedures for the safe use of equipment. Add cross-references to published literature and equipment manuals to supplement information listed in SOPs instead of rewriting such procedures. Ensure that any materials referenced are readily available along with the SOPs.

11. Reporting requirements. Specify how to report the information generated from a SOP, such as raw data, equipment logs, or environmental records.

12. Archiving requirements. Retain a historical file of all SOPs, including revisions, in the archives (sec. 72). Do not maintain the SOPs of contract laboratories, consultants, or universities in Forest Service archives; instead, ensure that they are readily available upon request and that their location is specified in Forest Service archives. Keep historical records of SOPs indefinitely, not just for the lifetime of the product (sec. 73.1).

13. Responsible individuals who ensure compliance and validation. List at least one individual by job title, not actual name, who is responsible for ensuring the implementation of the SOP. Require this individual to ensure that the provisions of the SOP are properly followed. For example, each piece of equipment should have a primary person responsible for overseeing its proper operation and maintenance and for ensuring that other members of the technical staff are following the SOP.

14. Contingencies. Include contingencies to follow when unexpected circumstances disrupt an operation. For example, a contingency plan can describe how data would be collected manually if the automated data collection system failed. Contingency plans should cover common problems that deviate from the SOP so that appropriate actions can be taken by the technical staff without authorization from the Study Director (sec. 52.3). Each SOP should also include provisions for health and safety, including provisions for handling emergency situations.

15. References and appendices. Published literature and instrument manuals can be referenced. Other materials, such as standard data collection forms or procedures copied from a manual, can be appended.

52.11 - Examples of Standard Operating Procedures

Examples of several SOPs are presented in exhibits 01 through 03.

1. Exhibit 01 - SOP Format. Exhibit 01 is a suggested format for writing SOPs that can be modified to meet the needs of a given facility. The creation of a Document Control Officer, as described in the exhibit, is not mandated in the Good Laboratory Practice regulations, but is merely one way to ensure proper SOP distribution and archiving. Appendix A to exhibit 01 is a sample format for developing SOPs and lists the critical elements. These formats may be modified by individual field units to suit their needs.

2. Exhibit 02 - Laboratory Glassware. Exhibit 02 is a sample SOP developed for cleaning laboratory glassware.

3. Exhibit 03 - PE160 Mettler Balance. Exhibit 03 is a sample SOP developed for operating a PE160 Mettler Balance.

52.11 - Exhibit 01

Sample Standard Operating Procedures

TITLE: Writing Standard Operating Procedures (SOPs)

NUMBER: AD001.001.01.

EFFECTIVE DATE: October 1, 1992.

APPROVING OFFICIALS:

	Name	Title	Date
APPROVED BY:	George Meade	Assistant Director	4/20/93
APPROVED BY:	Jessie A. Micales	Study Director	4/15/93
APPROVED BY:	M. F. Maury	Microbiologist (peer review)	4/10/93
APPROVED BY:	Carolyn Boyle	QAU Manager	4/17/93
APPROVED BY:	Porter Alexander	Author	4/12/93

DATES OF REVIEW AND ACTIONS TAKEN: April 20, 1993 - SOP initially adopted.

DATE OF NEXT REVIEW: April 1, 1994.

TITLE. Writing Standard Operating Procedures (SOPs).

PURPOSE. To ensure that all Standard Operating Procedures (SOPs) contain the required information in a consistent format.

SCOPE. This SOP is a management directive for all research units at the Forest Products Laboratory and must be followed in developing new SOPs and in revising existing SOPs.

DEFINITIONS.

Standard Operating Procedure. (SOP). A management directive that describes all routine procedures not covered by a specific protocol.

Effective Date. Date that the SOP is distributed to research units.

Document Control Officer. (DCO). A staff member, appointed by management, who is responsible for the distribution and copying of all SOPs.

PROCEDURES.

1.0 Format.

1.1 Each Standard Operating Procedure (SOP) should use the format described in Appendix A of this SOP and should address the topics listed in Appendix A. When a particular topic is not appropriate for a given SOP, insert "N/A" ("not applicable") after the topic designation.

2.0 Numbering system.

2.1 All Standard Operating Procedures must have a unique number for identification. This number should consist of a series of three "Group Identifiers" composed of a combination of letters and numbers as described in sections 2.11 - 2.13.

2.11 The first set of characters is composed of a 2-letter code plus a 3-digit number which indicates the general subject category of the Standard Operating Procedure (SOP) and a unique SOP number. For example, AR014 refers to SOP #14 on archiving procedures.
A list of general subject abbreviations is presented in Appendix B.

2.12 The second set is a 3-digit number that refers to the version number. This will change as the Standard Operating Procedure (SOP) is revised. For example, AR014.002 refers to the second version, or first revision, of SOP AR014.

2.13 The third set is a 2-digit number that indicates the copy number of the specific Standard Operating Procedure (SOP). For example, AR014.002.01 refers to copy #1 of SOP AR014.002. Copying SOPs is discussed under the section "Distribution and Archiving."

3.0 Preparation and Approval.

3.1 Standard Operating Procedures (SOPs) may be written by any staff member when a routine procedure is identified as being new or markedly different from that described in an existing SOP. The draft SOP is routed to all pertinent individuals for comment, including the Study Director and at least one other technical or professional staff member for peer review. A member of the Quality Assurance Unit must also review the SOP to ensure that it conforms to the proper format.

3.2 The revised, final draft will be routed to all previous reviewers for signature. It will then be sent to management for approval and signature. All signatures should appear on the first page of the Standard Operating Procedure.

3.3 The effective date of the SOP is placed on the first page by the Document Control Officer at the time of distribution.

3.4 Allow only official copies of a Standard Operating Procedure (SOP) to circulate in the laboratory. Each copy must have a unique number. Additional copies of an SOP many be requested from the Document Control Officer.

REPORTING REQUIREMENTS. Write all Standard Operating Procedures in the format shown in Appendix A.

DISTRIBUTION AND ARCHIVING.

1.0 Distribution.

1.1 At least one copy of the Standard Operating Procedure must be available at all times to all users in the work area.

1.2 One copy of the Standard Operating Procedure should be filed with the Quality Assurance Unit manager.

1.3 Two copies of the Standard Operating Procedure should be placed in the central files of the Forest Products Laboratory.

1.4 Additional copies of the Standard Operating Procedure may be requested from the Document Control Officer.

1.5 The Document Control Officer (DCO) is responsible for the distribution of all new Standard Operating Procedures (SOPs) and new versions of existing SOPs. The DCO should record in a log book who receives each copy of an SOP. Old SOPs should be collected before new versions are distributed. Different versions of an SOP should not be in circulation simultaneously.

2.0 Archiving.

2.1 The Document Control Officer is responsible for placing copies of retired Standard Operating Procedures (SOPs) in the Archives. Old SOPs should be indexed in a log book to facilitate retrieval within the archives.

INDIVIDUALS RESPONSIBLE FOR ASSURING COMPLIANCE.

1.0 Study Director.

1.1 The Study Director is responsible for ensuring that all Standard Operating Procedures (SOPs) used in a study are followed and that all personnel are informed of the location of each SOP.

1.2 The Study Director shall ensure that all personnel are properly trained in the use of each Standard Operating Procedure.

1.3 The Study Director must be able to ensure the validity of each Standard Operating Procedure used in a study.

2.0 Quality Assurance Unit. Members of the Quality Assurance Unit must review each Standard Operating Procedure (SOP) to ensure that it conforms to the format described in this SOP and that it is assigned a valid SOP number.

3.0 Document Control Officer. The Document Control Officer (DCO) is responsible for the distribution and circulation of all Standard Operating Procedures used in the Forest Products Laboratory. Another individual should be assigned to this task if no DCO is designated.

SCHEDULED REVIEW AND REVISION.

1.0 Responsible Individuals. The Study Director is responsible for ensuring that all Standard Operating Procedures (SOPs) used in a study are current. Study Directors are also responsible for scheduling SOP reviews and designating individuals for making the review and revision.

2.0 52.11 - Exhibit 01--continued

3.0 Review Schedule. Each Standard Operating Procedure should be reviewed at least annually to determine whether modifications are necessary. Review should begin no later than 11 months after an SOP's effective date. Major modifications of existing procedures will necessitate an earlier review and revision.

4.0 Revision Schedule. Standard Operating Procedures that require revision should be revised and approved within 45 days of the initiation of the revision process.

CONTINGENCIES. Any circumstances arising that prevent this Standard Operating Procedure (SOP) from being followed must be reported to the Quality Assurance Unit (QAU). Any variation from this SOP must be approved by the QAU in writing since it involves SOP preparation.

REFERENCES AND APPENDICES. Appendix A is a sample format that can be used to develop all Standard Operating Procedures (SOPs). Appendix B lists abbreviations for SOP subject identification.

APPENDIX A

Sample Format for Developing Standard Operating Procedures - Cover Page

TITLE: Chlorothalonil: Field Dissipation Study.

NUMBER: CLTH 21402.

EFFECTIVE DATE: April 20, 1993.

APPROVING OFFICIALS:

	Name and Signature	Title	Date
APPROVED BY:	George Meade/s/George Meade	Assistant Director	4/13/93
APPROVED BY:	Jessie Micales/s/Jessie Micales	Study Director	4/11/93
APPROVED BY:	M.F. Maury/s/M.F. Maury	Microbiologist	4/9/93
APPROVED BY:	Carolyn Boyle/s/Carolyn Boyle	Quality Assurance Manager	4/10/93
APPROVED BY:	J. Longstreet/s/J. Longstreet	Author	4/5/93

DATES OF REVIEW AND ACTIONS TAKEN:

SOP initially approved April 13, 1993.

DATE OF NEXT REVIEW: April 1, 1994.

Sample Standard Operating Procedures - Suggested Format

TITLE. Give the title of the Standard Operating Procedures.

PURPOSE. Clarify the purpose of the Standard Operating Procedure.

SCOPE. Define scope. Does this Standard Operating Procedure apply to an individual work unit or laboratory, or does it apply to the entire region?

DEFINITIONS. Give definitions of all terms that a technically competent worker would not be familiar with.

TEXT. Include procedures, processes, materials, transformations, or calculations.

REPORTING REQUIREMENTS. List all information that must be reported.

ARCHIVING REQUIREMENTS. List all materials that are to be archived. Include the length of time that they need to kept in the archives.

INDIVIDUALS RESPONSIBLE FOR COMPLIANCE. List individuals by title who are responsible for compliance with this SOP.

SCHEDULED REVIEW AND REVISION. Indicate when the SOP should be reviewed. Reviews must be conducted annually.

CONTINGENCIES. List contingencies that can be used if the SOP cannot be followed exactly due to outside circumstances.

REFERENCES AND APPENDICES. Include copies of any forms in the appendices.

APPENDIX B

Abbreviations for Standard Operating Procedures Subject Identification

AD Administrative. All Standard Operating Procedures (SOPs) involved with the administration of Good Laboratory Practices (GLPs), such as SOP preparation, procedures for U.S. Environmental Protection Agency inspections, and record keeping requirements.

AR Archiving. All SOPs detailing archiving procedures.

EQ Equipment. All SOPs detailing equipment operation, maintenance, calibration, and standardization.

FO Facility Operation. Any procedures for the day-to-day operation of the facility, including field plot maintenance, greenhouse operation, and production of the test system.

LB Laboratory Operation. All laboratory procedures not involved with equipment operation, such as cleaning glassware, preparing buffers, and specimen preparation.

QA Quality Assurance. All SOPs used by the Quality Assurance Unit.

PS Personnel. All SOPs involved with GLP personnel requirements. Includes maintenance of personnel records and responsibilities of Study Directors and management.

SA Safety. All SOPs regarding safety procedures.

TS Test, Control, or Reference Substances. All SOPs involved with receiving, handling, distributing, testing, and disposing of the test, control, and reference substances.

FT Field Test. All SOPs unique to field testing.

52.11 - Exhibit 02

Sample Standard Operating Procedure for Cleaning Laboratory Glassware

TITLE. Cleaning Laboratory Glassware.

NUMBER. LB004.002.01.

EFFECTIVE DATE. January 1, 1992.

APPROVING OFFICIALS.

	Name	Title	Date
APPROVED BY:	T. J. Jackson	Assistant Director	12/20/92
APPROVED BY:	Jessie A. Micales	Study Director	12/19/92
APPROVED BY:	M. F. Maury	Microbiologist (Peer Review)	12/15/92
APPROVED BY:	Carolyn Boyle	Quality Assurance Unit Manager	12/17/92
APPROVED BY:	Mary Chestnut	Author	12/07/92

DATES OF REVIEW AND ACTIONS TAKEN.

December 23, 1991 Standard Operating Procedure (SOP) originally adopted.

December 22, 1992 SOP reviewed and revised to reflect current practices.

December 21, 1993 SOP reviewed and accepted without revision.

Name and Title of Approving Official: Thomas J. Jackson

DATE OF NEXT REVIEW. December 1, 1994.

PURPOSE. To ensure that all laboratory glassware is properly cleaned.

SCOPE. This SOP is a management directive for all research units at the Forest Products Laboratory and must be used in all Good Laboratory Practices studies.

DEFINITIONS. Not applicable.

PROCEDURES.

1.0 Glassware for Physiological Experiments. Glassware that is to be used for physiological experiments shall be soaked in a dichromate solution (sec. 1.1) for 12 - 24 hours. It shall then be carefully removed from the acid with long-handled forceps and rinsed 5 times in hot tap water and 2 times in distilled water. Glassware that is not to be used for accurate volumetric work can be oven-dried.

1.1 Preparation of Glassware Cleaning Solutions.

1.11 Nitric acid - Dichromate. Add 200 g potassium dichromate (MW 294.21) to 50 ml distilled water. To this add 50 ml of nitric acid (undiluted).

1.12 Sulfuric acid - Dichromate. Dissolve 40 g potassium dichromate (MW 294.21) in 150 ml water in a large beaker (> 500 ml). Place the beaker in a cold water bath and slowly add 230 ml of concentrated sulfuric acid.

1.2 Safety. All acid baths shall be located in fume hoods and suitably covered at all times.

Precautions must be taken for working with concentrated acids. Staff must wear appropriate attire, including face shield, lab coat or coveralls, rubber apron, and heavy rubber gloves. All staff using this SOP must be familiar with safety requirements described in the Health and Safety Code Handbook, FSH 6709.11, chapters 8 and 9.

Safety personnel shall be called immediately (extension 590) in the event of an acid spill. Skin that has been exposed to acid should be immediately flushed with water. All personnel must know the location of emergency showers and eye wash stations.

2.0 Glass Petri Plates and Tubes. Autoclave discarded culture plates and tubes at 15 lbs psi for at least 15 minutes. Pour the liquified agar into a bucket and allow it to solidify before disposal. Place the Petri plates and tubes in 3 percent Lysol for 10-15 minutes, then wash with hot soap and water, rinse in hot and then cold tap water. Use distilled water for the final rinse. Glassware can be oven-dried.

3.0 New Glassware. New glassware tends to give off free alkali. It should be placed in 1 percent hydrochloric acid (HCl) overnight, washed in tap water, and then rinsed in distilled water.

REPORTING REQUIREMENTS. N/A.

ARCHIVING. N/A.

INDIVIDUALS RESPONSIBLE FOR ENSURING COMPLIANCE. The Study Director shall ensure that the SOP is being followed.

SCHEDULED REVIEW AND REVISION. The review process for this SOP shall begin no later than December 1, 1994. The Study Directors involved with GLP research shall designate an individual to review the SOP and determine whether revisions must be made.

CONTINGENCIES. Broken autoclaves or disruptions of the water supply should be reported to the General Foreman of the Research Facilities Engineering Department using a work request form (FPL-7100-1). An extra set of clean glassware should be available in case normal washing procedures are disrupted by a failure of power, water, or steam. Glassware may be cleaned in other portions of the facility if failures are localized to a particular laboratory or set of laboratories.

Any other circumstances that prevent this SOP from being followed must be reported to the Study Director. Any variation from this SOP must be approved by the Study Director in writing.

REFERENCES.

Dhingra, O.D. and Sinclair, J.B. 1985. Basic Plant Pathology Methods. Boca Raton, FL: CRC Press, Inc.

Tuite, J. 1969. Plant Pathology Methods. Minneapolis, MN: Burgess Publishers.

52.11 - Exhibit 03

Sample of a Standard Operating Procedure for Operating a PE160 Mettler Balance

TITLE. Operation of a PE160 Mettler Balance.

NUMBER. EQ002.001.01.

EFFECTIVE DATE. November 20, 1992.

APPROVING OFFICIALS.

	Name	Title	Date
APPROVED BY:	W. T. Sherman	Assistant Director	11/12/92
APPROVED BY:	Jessie A. Micales	Study Director	11/05/92
APPROVED BY:	A. P. Hill	Res. Plant Pathologist (Peer Review)	10/30/92
APPROVED BY:	Carolyn Boyle	Quality Assurance Unit Manager	11/08/92
APPROVED BY:	E. Rhoades	Author	10/15/92

DATES OF REVIEW AND ACTIONS TAKEN. November 12, 1992. Current version of Standard Operating Procedure (SOP) accepted.

DATE OF NEXT REVIEW. November 1, 1993.

TITLE. Operation of a PE150 Mettler Balance.

PURPOSE. To ensure that the PE160 Mettler balance is properly used, maintained, and calibrated.

SCOPE. This SOP is a management directive for all research units at the Forest Products Laboratory that use a PE160 Mettler balance. The procedures described must be employed for all Good Laboratory Practices (GLP) studies.

DEFINITIONS.

Taring the Balance. Setting the display to zero while a given weight (such as a container or weighing paper) is on the weighing pan.

52.11 - Exhibit 03

PROCEDURES.

1.0 Initial Set-Up Procedures. Initial set-up procedures are described on pages 4-5 of the Operating Instructions. These operations shall be followed upon receipt of a new balance or when an older balance is being reinstalled after a period of disuse.

2.0 Operation of the Balance. Additional operations not described below are detailed in the Operating Instructions, pages 6-11.

2.1 Selecting the Weight Unit. The PE160 can display weight in grams, kilograms, pounds, ounces, carets, grains, and several other units. To select or change the weight unit, unplug the power cable, press down the control bar, and reattach the power cable while continuing to hold down the bar. The display will indicate "Unit." On the right-hand side of the display, a series of abbreviations will flash indicating the different weight units. When the desired weight unit is displayed, release the control bar. More detailed instructions are given on page 8 of the Operating Instructions.

2.2 Turning the Balance On and Reading the Weight. Always turn the balance on with the pan empty. Briefly depress the single control bar. The display will give a temporary setting showing all possible readings. It will then switch to "0.000 g" (when "grams" are the designated weight unit). Place the object to be weighed on the pan. The weight (and units) will be displayed.

2.3 Turning the Balance Off. Lift the control bar.

2.4 Power Interruption Indicator. If the power is disrupted, the word "OFF" will be displayed as soon as power is restored. This is removed by briefly pressing the control bar.

2.5 Taring the Balance. Briefly press the control bar while the pan is empty to turn the balance on. Place the container (or other object) on the pan, and press the control bar again. The display will return to zero indicating that the object has been tared out. The weight of materials added to the container will then be displayed.

2.6 Subtractive Weighing. A container already filled with a material can be tared out. This makes it possible to weigh out from the container without having to calculate how much material has been removed. Place the container with the substance on the weighing pan and tare the balance. The display will read zero. Remove some of the substance from the container. The weight of the removed substance will appear in the display with a negative sign in front.

3.0 Calibration of the Balance.

3.1 How to Calibrate the Balance. The balance must be connected to the power supply for at least 30 minutes before calibration. The plastic draft shield should be in place.

1. Level the balance.

2. Turn on the balance. Place a test weight on the weighing pan. Read the display once it has stabilized.

3. If the display does not accurately reflect the weight of the test balance (to the last digit), the balance must be recalibrated. Press the control bar until the display indicates "___", then release the control bar. The abbreviation "CAL" will be displayed. Place the test weight on the pan. The balance will automatically recalibrate itself.

3.2 Caring for the Test Weights. The test weights should be handled very carefully and should not be touched with bare hands. Use forceps to move them and store them in the supplied storage box.

3.3 When to Calibrate the Balance. The balance should be checked and calibrated if necessary every morning, or before use (if the balance is not used every day). Calibration records shall be maintained in the equipment log.

4.0 Maintenance of the Balance.

4.1 Cleaning. The balance should be kept clean at all times. Any chemicals spilled on or around the pan should be immediately removed. The pan can be removed to clean under it. Do not use any strong solvents or the paint of the balance housing may be damaged.

4.2 Changing Fuses. Procedures for changing the fuse in the balance are detailed on page 16 of the Operating Instructions. If the fuse needs to be replaced repeatedly for no immediate reason, call the Mettler Service Department.

4.3 Troubleshooting. A list of procedures to follow in case the balance does not appear to be operating is given on page 18 of the Operating Instructions.

4.4 Maintenance Records. All maintenance must be recorded in the equipment log.

4.5 Safety. The balance should be unplugged before any maintenance is performed.

REPORTING REQUIREMENTS. All calibration and maintenance records shall be kept in an equipment log for the PE160 Mettler Balance. These records should contain the date of the operation and whether maintenance was routine and followed Standard Operating Procedures. All nonroutine maintenance designations must include a description of the repairs performed on the balance as a result of failure or malfunction. These notations should include the nature of the defect, how and when the defect was discovered, and whether any remedial action was taken in response to the defect.

ARCHIVING. Equipment logs must be stored in the archives upon completion of the notebook. Make the logs readily accessible and indicate their location in the archive index.

INDIVIDUALS RESPONSIBLE FOR ENSURING COMPLIANCE. The senior technician or professional support person of each research unit is responsible for the operation, maintenance, and calibration of the PE160 Mettler balances located in that unit. This person will ensure that the SOP is being properly followed and that the research staff is adequately trained in operation of the balance.

SCHEDULED REVIEW AND REVISION. The review process for this SOP shall begin no later than November 1, 1993. The Study Directors involved with GLP research shall designate an individual to review the SOP and determine whether revisions must be made.

CONTINGENCIES. If the balance appears to be functioning incorrectly, consult the troubleshooting guide in the Operating Instructions (page 18). Make a notation in the equipment log describing the nature of the malfunction, how and when the malfunction was discovered, and whether any remedial action was taken in response to the malfunction. If actions suggested by the troubleshooting guide do not correct the malfunction, call the Mettler Service Department for assistance. A back-up balance, which can weigh materials in a similar weight range, should be available in case of balance failure. Any other circumstances that prevent this SOP from being followed must be reported to the Study Director. Any variation from this SOP must be approved by the Study Director in writing.

REFERENCES

Operating Instructions - PE160, PE600, PE1600. Mettler Instruments. Hightstown, NJ. These instructions are available from the Biodeterioration and Preservation of Wood Research Unit located in building 1, room 153.

52.2 - Topics

1. Mandatory topics. Standard Operating Procedures (SOPs) must be written for the following operations (sec. 01, ex. 01; 40 CFR 160.81b):

    a. Test system area preparation.

    b. Test system care.

    c. Receipt, identification, storage, handling, mixing, and method of sampling the test, control, and reference substances.

    d. Test system observations.

    e. Laboratory or other tests.

    f. Handling of test systems found dead during the study.

    g. Necropsy or postmortem examination of dead test systems.

    h. Collection and identification of specimens.

    i. Histopathology.

    j. Data handling, storage, and retrieval.

    k. Maintenance and calibration of equipment.

    l. Transfer, proper placement, and identification of test systems.

2. Suggested topics. The SOPs should also be prepared for the following:

    a. Responsibilities of management, Study Directors, Quality Assurance Unit (QAU) personnel.

    b. Procedures for national and local QAU inspections (sec. 91).

52.11 - Exhibit 03--continued

c. Archiving procedures.

d. Procedures to be followed during a U.S. Environmental Protection Agency audit or inspection (sec. 93).

e. Procedures to be followed in case of a pesticide spill or poisoning.

Prepare written SOPs only for those procedures that are actually performed. For example, the requirement to have written SOPs for necropsies and postmortem examinations would not be mandatory in studies that use plants as the test system.

52.3 - Changes and Deviations

Ensure that all deviations from established Standard Operating Procedures (SOPs) in a study are:

1. Authorized by the Study Director and sponsor.

2. Thoroughly documented in the raw data.

Amend SOPs if changes in established SOPs become accepted procedure. All SOPs should be reviewed annually and updated when necessary to ensure that they accurately describe current operations.

53 - Reagents and Solutions

(Sec. 01, ex. 01; 40 CFR 160.83). Label all reagents and solutions properly to indicate identity, titer or concentration, storage requirements, and expiration date. Do not use deteriorated or outdated reagents; instead, dispose of these properly (FSH 6709.11, sec. 8-3; FSH 2109.12, ch. 40).

54 - Test System Care

Specific requirements for the care of test systems are in Title 40, Code of Federal Regulations, section 160.90 (40 CFR 160.90); (sec. 01, ex. 01). Investigators who utilize vertebrates, marine and fresh-water organisms, and other invertebrates as test systems should refer to section 01, exhibit 01 (40 CFR 160.90). Most Forest Service research utilizes plants, insects, or pathogens as the primary test system; therefore, additional direction in this Handbook on test system care is restricted to these organisms.

54.1 - Standard Operating Procedures for Test System Care

Have in place written Standard Operating Procedures for all aspects of test system care, including the following:

1. Planting, fertilizing, watering, and handling of plants;

2. Housing, feeding, and handling of insects; and

3. Caring for, and handling of, disease organisms (or pathogens).

54.2 - Prevention and Treatment of Incidental Disease

Isolate all newly received test systems and evaluate their health status before the study begins or before they are placed in contact with other test systems.

At the initiation of a study, ensure that the test systems are free of disease or any other condition that might interfere with the purpose or conduct of the study. Test systems that become incidentally diseased during the study should be isolated and may be treated if the treatment does not interfere with the study. In most cases, diseased test systems should be destroyed. The diagnosis, authorization of treatment, description of treatment, and each date of treatment must be thoroughly documented and retained with the raw data.

54.3 - Identification

Label test units adequately, such as potted plants in a greenhouse study, that are handled or moved to ensure that they are returned to the proper place. Include procedures for identifying test systems in the protocol.

54.4 - Separation of Species

Keep different species of plants and insects adequately separated and identified to prevent mix-up and cross-contamination. See section 31.1 for more detailed direction on separation of species.

54.5 - Detection of Contaminants

Water, nutrients, soil, and other materials used in a study may contain certain contaminants that could interfere with the study. The presence of contaminants may be indicated by irregularities from previous studies or from an examination of field plot or greenhouse records, including a listing of previously used pesticides. The protocol must specify an acceptable level of each contaminant known to be present and capable of interfering with the study. Analyze the water, nutrients, soil, or other materials prior to and during the study to ensure that acceptable levels are not exceeded. Records of the analyses are considered raw data and must be properly archived (sec. 72 and 73). Periodic testing is not required if there is no reason to suspect such contamination. In the protocol or Standard Operating Procedures, describe the means of assessing the probability of contamination, such as an examination of past field records. There is no need to analyze treated samples for contaminants if untreated control samples are collected and analyzed.

54.6 - Pest Control

Document carefully the use of any pest control materials to protect test systems or study areas. Do not use any cleaning or pest control material that interferes with the study.

54.7 - Acclimatization

Acclimate all plant and animal test systems to the environmental conditions of the study before use.

55 - Test, Control, and Reference Substances

55.1 - Characterization

(Sec. 01, ex. 01; 40 CFR 160.105).

55.11 - General Considerations

The identity, strength, purity, composition, and other characteristics that define test, control, and reference substances must be determined and documented for each batch before the substances are used in a study. This information may be obtained from the manufacturer. However, it is still necessary to conduct independent analyses of each batch under Good Laboratory Practices to ensure that the test, control, and reference substances are correctly characterized. Methods of synthesis, fabrication, or derivation of the compounds must be documented in the protocol and final report. For example, cite Technical Information Sheets obtained from the manufacturer.

55.12 - Solubility and Stability

When relevant to the study, the test facility or sponsor must determine the solubility of test, control, and reference substances. This must be done before the experimental start date to ensure that the test system is exposed to the proper amount of test, control, or reference substance.

Determine the stability of the test, control, and reference substances before the experimental start date. The study may be invalid if stability tests show that the compound is not stable. Periodic analyses of each batch may be conducted throughout the duration of the study. However, accelerated stability tests, performed under extreme conditions, are not an adequate means of determining a substance's stability. For each study, determine the stability of test, control, and reference substances kept in storage.

55.13 - Storage Containers

Label each storage container for a test, control, or reference substance with the name of the compound, chemical abstracts service number (CAS) or code number, batch number, and, when appropriate, the expiration date and description of proper storage conditions. Label all containers according to the Hazardous Materials Program requirements (FSH 6709.11, ch. 9). Keep compounds in their assigned storage containers throughout the study to avoid mix-up. Assign test substance storage containers for the duration of the study and keep empty and unused containers until the study ends. The U.S. Environmental Protection Agency has occasionally waived the latter requirement if it can be shown that storing containers creates a special burden or safety hazard.

55.14 - Retention of Reserve Samples

For studies that last longer than 4 weeks, take reserve samples of each batch of test, control, or reference substance and store them in the archives (sec. 73.11 and 73.12).

55.2 - Handling

(Sec. 01, ex. 01; 40 CFR 160.107).

55.21 - Standard Operating Procedures

To ensure the proper handling of all test, control, and reference substances, develop Standard Operating Procedures, which include proper procedures for:

1. Storage. See sections 32.1, 55.13, 55.14, and 55.22; FSH 2109.12, chapter 10; and FSH 6709.11, chapters 9 and 10 for additional direction on storage.

2. Distribution. Identify distribution procedures that avoid:

    a. Contamination, deterioration, and damage to test, control, and reference substance, and

    b. Injury to handlers.

3. Identification throughout the distribution process. If a substance is subdivided, ensure that each container has a unique number.

4. Documentation throughout shipping and distribution. Documentation includes the date and quantity of each batch distributed or returned to storage. This information should be documented in the "Distribution and Use Log" (sec. 55.23). Officials from the U.S. Environmental Protection Agency may want to determine whether the amount of material remaining at the end of a study corresponds to the original quantity of the substance minus that used in the study. Document accurately how much substance is used in each study and record the amount of each substance retained in the archives as a reserve sample.

5. Disposal. (FSH 2109.12, ch. 40; FSH 6709.11, sec. 9-10).

6. Mixing. (Sec. 55.3).

7. Sampling. (Sec. 55.14).

8. Safety. (FSH 6709.11, ch. 9).

55.22 - Chain of Custody

Strict chain of custody requirements are not specified by the Good Laboratory Practices regulations, but the location and condition of all substances must be known at all times. Handle test, control, and reference substances in such a way as to remove any doubt as to their identity or the chance for contamination or mix-up. Chain of custody procedures may be used so that the location and composition of each container of test, control, or reference substance is known throughout the entire distribution path. A sample chain of custody documentation is given in exhibit 01.

Ship materials only by carriers that provide bills of lading. Ensure that procedures meet U.S. Department of Transportation requirements if the materials are hazardous.

See the guidelines for the transport of pesticides and other hazardous materials in FSH 6709.11, sections 9-4 and 9-10; FSH 2109.12, chapter 20; and FSH 6409.31, section 101-42.

55.22 - Exhibit 01

Sample Chain of Custody Record

Study Number and Title: CLTH 21402 Chlorothalonil: field dissipation

Name of Facility or Site: Forest Products Laboratory, shipped to Madison Analytical Associate

Location of Facility or Site: Madison, WI

Samplers: (Signature) Jessie A. Micales

Date	Time	Pesticide Requested	Sample Number	Sample Type	Sample Description	Remarks
9/10/93	10 AM	chlorothal.	001-A	50 ml sub-sample	grey emulsifiable concentrate; 50% AI	container shaken well before sample taken
9/10/93	10 AM	chlorothal.	002-A	50 ml sub-sample	grey emulsifiable concentrate; 50% AI	container shaken well before sample taken

Sent by: (Signature) Jessie A. Micales

Preservation Method: Stable at room temperature; sent in leak-proof canister

Date and Time Sent: 4/10/93; 11 AM by Badger Express Delivery Service

Received by: (Signature) J. Davis

Title: Head Chemist, Madison Analytical Associates

Telephone Number: 608-231-9215

Date and Time Received: 4/10/93 2 PM (CST)

55.23 - Documentation

Document the receipt and distribution of each batch of test, control, and reference substances by keeping a "Distribution and Use Log." Record the following information in this log when test, control, and reference substances are received from the sponsor, manufacturer, or distributer, or when it is necessary to document internal use:

1. Source.
2. Quantity.
3. Code number (unique for every container).
4. Color.
5. Type of packaging.
6. Shipper.
7. Amount of substance withdrawn from container.
8. Date of withdrawal.
9. Initials of person withdrawing substance.
10. Study for which substance is being used.
11. Additional information.

Move substances quickly from the loading dock to the formulation area. Document conditions at the loading dock, including how long the substance was at the loading dock and the conditions of storage.

55.3 - Mixing with Carriers

(Sec. 01, ex. 01; 40 CFR 160.113).

55.31 - Analyses

Ensure that appropriate analyses provide the following information for each test, control, or reference standard that is mixed with a carrier:

1. Uniformity or homogeneity of the mixture.

2. Concentration of the mixture, analyzed periodically.

3. Solubility relevant to the study. The sponsor or the test facility must determine solubility before the experimental start date.

4. Stability within the mixture. Conduct the analysis before the experimental start date or by concomitant analyses conducted during the course of the study.

Conduct these analyses to ensure that the methodology used to prepare the mixture is valid. It is not necessary to repeat analyses every time the mixture is prepared, but they must be done for each mixture in question.

55.32 - Labeling

If any component of a mixture has an expiration date, clearly show the date on the outside of the storage container. Show the earliest date if more than one component has an expiration date.

55.33 - Vehicles

Provide references, experimental data, or other documentation to show that surfactants and other additives do not interfere with the integrity of a study. Vehicles do not need to be chemically characterized, but their source must be documented. Compatibility data should also be included and is often available from the pesticide manufacturer.