

# SOP Log Sheet

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**MICHIGAN STATE  
UNIVERSITY**

**TO:** Celeste Wheeler  
Michigan State University  
Trevor Nichols Research Center  
6237 124<sup>th</sup> Ave  
Fennville, MI 49408

**FROM:** Nicole Soldan, IR-4 NC Regional Field Coordinator

**SUBJECT:** STANDARD OPERATING PROCEDURE APPROVAL

**DATE:** April 9, 2023 (Approval date) *Nicole Soldan*

Per 40CRF160 Good Laboratory Practice Standards (GLP), this is to notify you that your Standard Operating Procedures (SOPs) in use are approved. Please retain this document with your SOP to fulfill GLP requirements.

SOP	Review date	Revision date	SOP	Review date	Revision date
A.000.02	5-5-23	5-5-23	R.002.11	5-5-23	5-5-23
A.001.15	5-5-23	5-5-23	R.003.18	5-5-23	5-5-23
A.003.11	5-5-23	5-5-23	R.004.08	5-5-23	4-20-18
A.004.12	5-5-23	5-5-23	R.005.09	5-5-23	5-5-23
A.005.10	5-5-23	Retired	R.006.06	5-5-23	5-7-20
A.006.11	5-5-23	4-1-21	M.001.15	5-5-23	5-5-23
A.009.08	5-5-23	Retired	M.003.12	5-5-23	5-5-23
A.010.11	5-5-23	5-5-23	M.004.13	5-5-23	5-5-23
A.011.01	New	5-5-23	M.005.18	5-5-23	5-5-23
A.012.09	5-5-23	5-5-23	M.006.10	5-5-23	Retired
A.013.08	5-5-23	3-15-22	M.008.10	5-5-23	5-5-23
A.014.09	5-5-23	5-5-23	M.009.08	5-5-23	Retired
A.015.09	5-5-23	5-5-23	M.010.08	5-5-23	Retired
A.016.10	5-5-23	4-20-18	M.012.07	5-5-23	Retired
A.018.07	5-5-23	4-20-18	M.013.10	5-5-23	5-5-23
A.019.02	5-5-23	5-5-23	M.014.14	5-5-23	5-5-23
A.020.01	5-5-23	4-20-18	M.015.06	5-5-23	Retired
A.021.01	New	5-5-23	M.016.08	5-5-23	4-26-21
C.001.21	5-5-23	5-5-23	M.017.06	5-5-23	Retired
C.002.11	5-5-23	4-20-18	M.018.08	5-5-23	4-20-18
C.003.13	5-5-23	5-7-20	M.019.06	5-5-23	5-5-23
C.004.12	5-5-23	5-7-20	X.001.06	5-5-23	4-20-18
C.005.04	5-5-23	5-5-23	X.002.05	5-5-23	4-20-18
R.001.11	5-5-23	4-20-18			



**IR-4 North  
Central Region  
Field  
Coordinator's  
Office**

**Department of  
Entomology**

1066 Bogue St.  
Rm A448  
East Lansing, MI 48824

*The following are the current Standard Operating Procedures used by Trevor Nichols Research Center Staff in compliance with Good Laboratory Standards.*

## **Standard Operating Procedures**

May 5, 2023

### **Section A – Archiving and Data Gathering**

A.000.02	Standard Operating Procedure for Standard Operating Procedures
A.001.15	Archiving Storage of Records and Raw Data
A.003.11	Soil Sampling for Soil Characteristics
A.004.12	Recording of Raw Data
A.006.11	Measuring Wind Speed and Direction
A.010.11	Curriculum Vitae
A.011.01	Job Description
A.012.09	Master Trial Schedule
A.013.08	Weather Data
A.014.09	EPA Audit or Inspection
A.015.09	Sponsor Visit or Audit
A.016.10	Rounding-off Numbers
A.018.07	Developing the Residue Calculation Sheet
A.019.02	Data Archiving, Retention and Quality Control Review
A.020.01	Using Borrowed Equipment
A.021.01	Site Selection for GLP Field Trials

### **Section C – Chemical Related**

C.001.21	Receipt, Storage, and Disposal of Test Substance
C.002.11	Measuring Liquid Chemicals
C.003.13	Sartorius ENTRIS3202-1SUS Balance Calibration
C.004.12	Weighing Non-Liquid Chemicals on a Sartorius ENTRIS3202-1SUS Balance
C.005.04	Receipt, Storage, Use, and Disposal of Adjuvants

### **Section M – Maintenance and Calibration**

M.001.15	Maintenance and Cleaning of Airblast Sprayers
M.003.12	Verification of Electronic Digital Water Meter
M.004.13	Maintenance of Farm Tractors
M.005.18	Calibration of Airblast Sprayers
M.008.10	Test Systems Observation, Preparation, and Care
M.013.10	Application of Test Material with an Airblast Sprayer
M.014.14	Designated Personnel for Maintenance/Calibration
M.016.08	Measurement of pH and Water Temperature for Test Substance Application
M.018.08	Cherry Cooling System Calibration
M.019.06	Hobo Temperature System, My Spool Alarm System and Freezer Backup

### **Section R – Residue Samples**

R.001.11	Collecting Residue Samples
R.002.11	Packing and Shipping of Residue Samples
R.003.18	Storage of Residue samples
R.004.08	Residue Test Plot Design
R.005.09	Cherry Cooling System
R.006.06	Calibration of Hobo Temperature System

## **Section X – Miscellaneous**

- X.001.06            Safety and Safety Inspection
- X.002.05            Treated Crop Destruct

TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

**Standard Operating Procedure for Standard Operating Procedures**

SOP Number: A.000.02

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To ensure that Trevor Nichols Research Center (IR-4 Research Center) staff will have written SOP's in place, for field residue trials study methods, to ensure the quality and integrity of a study.

EQUIPMENT DESCRIPTION:

A copy of the Good Laboratory Practice Standards must be used.

PROCEDURES:

The designated personnel that will conduct the preparation of Standard operating procedures will refer to the following outlined SOP and Good Laboratory Practice Standards (40 CFR Part 160) to ensure the integrity of the studies.

PREPARATION OF STANDARD OPERATION PROCEDURES:

1. A standard operating procedure, or SOP, is a written document that describes how routine activities are to be performed. The IR-4 Field Research Director will develop standard operating procedures (SOPs) for all phases of research conducted in support of chemical registration.
2. The protocol always takes precedence over any SOP.
3. An SOP should exist for all routine procedures and regularly used equipment. Individuals completely familiar with the process or equipment should write the SOPs. The SOP should include enough detail so that someone with the appropriate education, training, and experience can perform the procedure correctly.
4. The individual SOPs, together with an Index and SOP Review Log will constitute SOPs for IR-4 chemical residue studies at Trevor Nichols Research Center.
5. SOPs will be reviewed annually and revised as needed. The review and revisions will be recorded on the SOP Review Log, which will be maintained as part of the SOPs. All earlier versions of SOPs must be sent to IR-4 Headquarters to archive.
6. Each individual SOP will be approved by the Regional Field Coordinator.
7. Any deviations from the SOPs that would affect the results of a study must be documented in writing and signed by the Study Director.
8. In the SOPs, the following terms will have the meanings specified.
  - a. Batch – a specific quantity or lot of a test substance that has been adequately characterized
  - b. Experimental start date – the first date the test substance is applied to the test system (crop).
  - c. Experimental termination date – the last date on which data are collected directly from a study

- d. Good Laboratory Practices (GLP) – a set of guidelines mandated by Congress to which researchers must adhere to assure the integrity of research data. All IR-4 studies are conducted under GLP guidelines.
  - e. Master Timetable – a list of trials which is maintained by the Field Research Director. It must be indexed by chemical and crop, and contain type of trial, approximate experimental start dates, and termination dates.
  - f. Master Schedule – a list, maintained by the quality assurance unit, of all studies conducted at the testing facility indexed by test substance, and containing the test system, nature of study, date study was initiated, current status of each study, identity of the sponsor, and name of the study director.
  - g. Protocol – a specific document, provided by the sponsor that contains details for accurate completion of a trial.
  - h. Quality Assurance Unit (QAU) – any person or organizational element as per 40CFR 160.35, who is designated to perform the monitoring duties to assure that the research is conducted according to standard operating procedures and good laboratory practices. Regional IR-4 representatives will designate the Quality Assurance Officer (QAO) for IR-4 trials.
  - i. Raw Data – worksheets, records, memoranda, notes, etc., that are the results of original observations and activities of a study. This includes photographs and computer printouts.
  - j. Sponsor – the individual, corporation, association, scientific or academic establishment, government agency or other organizational unit who initiates and supports, by provision of financial or other resources, a study.
  - k. Standard Operating Procedures (SOP) – written documentation of routine activities utilized in research studies.
  - l. Trial – an experiment in which a test substance (pesticide) is applied to a test system to determine or help predict its effect, metabolism, environmental and chemical fate, or other characteristics.
  - m. Frequently Used Acronyms –
    - i. Michigan State University (MSU)
    - ii. Trevor Nichols Research Center (TNRC)
    - iii. Clarksville Research Center (CRC)
9. The Regional Field Coordinator and other study personnel will receive copies of the SOPs on request. The original SOPs will be kept in a secure file in the Field Research Directors office.
10. The original copy of the previous years SOPs will be shipped to IR-4 Headquarters for archiving within one year of the updated version being signed by the Field Research Director.
11. Each SOP will contain a title page, which will include: the facility name, the title of the SOP, SOP number, revision date, and the effective date.
12. Each SOP shall have a unique classification letter and a unique numbering system. The letter classification will be as follows: A. = Archiving and Data Gathering; C. = Chemical Related; R. = Residue Samples; M. = Maintenance and Calibration; X. = Miscellaneous



13. The unique numbering system will start following the initial of the classification letter; a series of three numerical digits, followed by a period, then a series of two numerical digits will be used to identify each SOP.
14. The first set of three numerical digits will indicate the number of the SOP and the second set of two numerical digits indicates the number of approved revisions to the original SOP. For example, this SOP is A.000.02.
15. Each SOP will contain a purpose and procedure.
16. The SOP's will be made available to all personnel involved in the residue trial process conducted at the Trevor Nichols Research Center. A copy of the SOP's will be in or near the equipment to be used.

## STANDARD OPERATING PROCEDURES REVIEW – REVIEW LOG

SOP NUMBER	DATE REVIEWED	REVISED (Yes, No, New, Retired)	REVISED SOP NUMBER	REVISION DATE
A.000.01	5/5/2023	Yes	A.000.02	5/5/2023
A.001.14	5/5/2023	Yes	A.001.15	5/5/2023
A.003.10	5/5/2023	Yes	A.003.11	5/5/2023
A.004.11	5/5/2023	Yes	A.004.12	5/5/2023
A.005.10	5/5/2023	Retired		
A.006.11	5/5/2023	No	A.006.11	4/1/2021
A.009.08	5/5/2023	Retired		
A.010.10	5/5/2023	Yes	A.010.11	5/5/2023
A.011.01	5/5/2023	New	A.011.01	5/5/2023
A.012.08	5/5/2023	Yes	A.012.09	5/5/2023
A.013.08	5/5/2023	No	A.013.08	3/15/2022
A.014.08	5/5/2023	Yes	A.014.09	5/5/2023
A.015.08	5/5/2023	Yes	A.015.09	5/5/2023
A.016.10	5/5/2023	No	A.016.10	4/20/2018
A.018.07	5/5/2023	No	A.018.07	4/20/2018
A.019.01	5/5/2023	Yes	A.019.02	5/5/2023
A.020.01	5/5/2023	No	A.020.01	4/20/2018
A.021.01	5/5/2023	New	A.021.01	5/5/2023
C.001.20	5/5/2023	Yes	C.001.21	5/5/2023
C.002.11	5/5/2023	No	C.002.11	4/20/2018
C.003.13	5/5/2023	No	C.003.13	5/7/2020
C.004.12	5/5/2023	No	C.004.12	5/7/2020
C.005.03	5/5/2023	Yes	C.005.04	5/5/2023
M.001.14	5/5/2023	Yes	M.001.15	5/5/2023
M.003.11	5/5/2023	Yes	M.003.12	5/5/2023
M.004.12	5/5/2023	Yes	M.004.13	5/5/2023
M.005.17	5/5/2023	Yes	M.005.18	5/5/2023
M.006.10	5/5/2023	Retired		
M.008.09	5/5/2023	Yes	M.008.10	5/5/2023
M.009.08	5/5/2023	Retired		
M.010.08	5/5/2023	Retired		
M.012.07	5/5/2023	Retired		
M.013.09	5/5/2023	Yes	M.013.10	5/5/2023
M.014.13	5/5/2023	Yes	M.014.14	5/5/2023
M.015.06	5/5/2023	Retired		
M.016.08	5/5/2023	No	M.016.08	4/26/2021
M.017.06	5/5/2023	Retired		
M.018.08	5/5/2023	No	M.018.08	4/20/2018
M.019.05	5/5/2023	Yes	M.019.06	5/5/2023
R.001.11	5/5/2023	No	R.001.11	4/20/2018
R.002.10	5/5/2023	Yes	R.002.11	5/5/2023
R.003.17	5/5/2023	Yes	R.003.18	5/5/2023

SOP NUMBER	DATE REVIEWED	REVISED (Yes, No, New, Retired)	REVISED SOP NUMBER	REVISION DATE
R.004.08	5/5/2023	No	R.004.08	4/20/2018
R.005.08	5/5/2023	Yes	R.005.09	5/5/2023
R.006.06	5/5/2023	No	R.006.06	5/7/2020
X.001.06	5/5/2023	No	X.001.06	4/20/2018
X.002.05	5/5/2023	No	X.002.05	4/20/2018

*Celste E Wheeler 5-5-23*

Signature and Date

TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

Archiving and Storage of Records and Raw Data

SOP Number: A.001.15

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To ensure that all records and raw data generated as a result of a study shall be logged and retained in an appropriate method.

EQUIPMENT DESCRIPTION:

Fire-retardant file cabinets will be used to archive all data generated from studies performed at the Trevor Nichols Research Center. The file cabinets must have a locking mechanism to ensure the integrity of the data.

PROCEDURES:

The designated personnel that will conduct the archiving of records and raw data will refer to the following outlined SOP to ensure the integrity of the data.

Main Archivist: Celeste Wheeler

1<sup>st</sup> Back-up Archivist: Amber DeVisser

2<sup>nd</sup> Back-up Archivist: John Wise

ARCHIVING AND STORAGE OF RECORDS AND RAW DATA PROCEDURES:

1. All raw data, documentation, records and copies of protocols generated as a result of a study shall be archived. The Master Schedule Sheet, records of all related training, job experience and job description for Trevor Nichols Research Center, the original of the Standard Operation Procedures and records for former employees will be archived.
2. All the above information will be logged into the Archiving Data Log Sheet (see attached sheet). This will include; a description of the data, the general location and the name of the personnel logging the data.
3. The archive area will be located in a designated office at the Trevor Nichols Research Center and will be sufficient in size to accommodate all of the records and raw data required by Good Laboratory Practice standards.
4. The file cabinets will remain locked at all times and only the Main Archivist and the Back-up Archivist will have keys to enter the cabinets.
5. All archived material will be indexed for expedient removal.
6. A Sign-in and Sign-out Log Sheet will be in the designated office to record all movement of the archived data (see attached sheet).
7. Archived Data will be kept indefinitely, and where appropriate, sent to IR-4 Headquarters within one year of completion of a study.





TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

Soil Sampling for Soil Characterization

SOP Number: A.003.11

Revision Date: 5/5/2023

Effective Date: See approved by RFC date



PURPOSE:

To ensure that representative soil samples are obtained and handled properly when gathering information on the general nutrient level and physical properties of soils.

EQUIPMENT DESCRIPTION:

A suitable tube-type soil sampler, long enough to sample at the appropriate depth. A plastic bucket large enough to hold soil samples. A soil sample box or bag to hold soil samples during delivery to the laboratory and a map of the orchard or area you are sampling.

PROCEDURES:

The designated personnel that will conduct the collecting of soil samples will refer to the following SOP to ensure the integrity of the samples.

SOIL SAMPLING PROCEDURES FOR SOIL CHARACTERIZATION:

1. Using a map of the orchard or area, locate the test site that requires soil sampling for soil characterization records specifically required in IR-4 field trial protocols.
2. Using a tube-type soil sampler, take a minimum of 5 core samples within the test plot area. Make sure all debris are removed from the spot of the soil sample to ensure the integrity of the samples.
3. Place all samples in a clean bucket and mix all the sample material together to ensure the composite sample is representative of the entire plot. The sample size should be large enough for the lab to run an accurate test.
4. Place the sample in the laboratory box or bag and mark the container to correspond with the sample area. Fill out all the requested information needed on the container and send a list of soil analyses needed to ensure the sample will get processed correctly. Ex. (% sand, % clay, % silt, soil type, pH....).
5. The sample should be sent out as soon as possible to the appropriate lab.
6. Document the day the samples were taken and the day they were sent to the lab and received from the lab on Soil Sample Log.



TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

Recording of Raw Data

SOP Number: A.004.12

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To ensure that the recording of raw data is done in compliance with Good Laboratory Practices.

EQUIPMENT DESCRIPTION:

Blue or black ink pen will be used when recording data on paper.

PROCEDURES:

The designated personnel that will conduct the recording of raw data will refer to the following outlined SOP to ensure the integrity of the data.

RECORDING OF RAW DATA PROCEDURES:

1. Raw data must always be recorded in blue or black ink pen if recorded on paper.
2. The name of the person making the entry will always be signed or initialed and dated.
3. White-out is not to be used. Original entries should be used. If transcriptions are used the location of the original data will be noted.
4. Corrections are permissible as long as the error is crossed-out with a single line, initialed, dated, and a reason given for the change. Correction codes can be used as follows: ME = math error; SE = spelling error; WE = wrong entry. Correction codes will be circled so as not to be confused with initials of person making the correction.
5. An appropriate logbook will be used for recording of data for site-specific logs. That logbook will be retained at the facility and archived at a later date.
6. Data recorded in sponsor provided notebooks or by electron field data notebooks will be documented according to instructions for notebooks.
7. Limited raw data that relates to multiple studies will be photocopied as raw data and verified as an original copy or exact copy.
8. Sponsor provided notebooks and logbooks will be kept in a locked fire-proof cabinets when not in use.

TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

**Measuring of Wind Speed and Direction**

SOP Number: A.006.11

Revision Date: 4/1/2021

Effective Date: See approved by RFC date

PURPOSE:

To ensure that the wind speed and direction recorded represents the actual weather at the test site.

EQUIPMENT DESCRIPTION:

A BTMETER BT-100 Handheld Anemometer Digital Wind Speed Meter is a hand held portable anemometer that reads the wind MPH.

A standard compass will be used to find the correct wind direction.

PROCEDURES:

The designated personnel that will conduct the collecting and recording of wind speed and direction will refer to the following outlined SOP to ensure the integrity of the data.

MEASURING OF WIND AND DIRECTION PROCEDURES:

1. Turn on the wind meter and make sure that the batteries are working.
2. Prior to the application of a test material to a trial site, the wind speed and direction must be known before the proper spray procedures can be initiated.
3. Standing in the center of the trial site, decide which way the wind is coming from, if necessary, use a compass to obtain the direction of the wind. Hold the wind meter at eye level perpendicular to the wind direction. Note the wind speed from the digital screen.
4. The wind speed and direction will be recorded in the appropriate Field Data Book.

TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

Curriculum Vitae

SOP Number: A.010.11

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

Trevor Nichols Research Center (IR-4 Field Research Center) will have as a part of their permanent records, curriculum vitae of all personnel involved in all residue trials to assure that procedures are done with qualified participants.

EQUIPMENT DESCRIPTION:

None

PROCEDURES:

The designated personnel that will participate in GLP trials will refer to the following outlined SOP to ensure the integrity of the data.

CURRICULUM VITAE PROCEDURES:

1. Personnel will maintain curriculum vitae's that will contain name, title, education, work experience and special training or qualifications, or accomplishments.
2. Personnel will write their name, date and initials as they would initial data or any other type of information that would be archived or pertaining to GLP. The curriculum vitae's will be reviewed and updated annually.
3. CV's of personnel who no longer work at Trevor Nichols Research Center will be archived and kept indefinitely.
4. The following information must be provided in the blanks (see attached sheet) or a CV document may be attached with equivalent information.



**Curriculum Vitae**  
Trevor Nichols Research Center – Michigan State University

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Education: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Work Experience: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Special Training, Qualifications or Accomplishments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signature: \_\_\_\_\_ Initials: \_\_\_\_\_ Date: \_\_\_\_\_

TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

Job Description

SOP Number: A.011.01

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

Trevor Nichols Research Center IR-4 Personnel will have a job description on file describing how they participate in IR-4 GLP trials.

EQUIPMENT DESCRIPTION:

None.

PROCEDURES:

1. Include Name, Title, and brief description of key duties in the IR-4 GLP system.
2. The job descriptions will be reviewed and updated annually.
3. The following information shall be provided in the blanks (or equivalent information on attached sheet).
4. Original signed/dated Job Descriptions of all personnel will be archived and kept indefinitely at the Field Office or mailed in to IR-4 Headquarters.

Job Description

Trevor Nichols Research Center – Michigan State University

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Title: \_\_\_\_\_

Fulfill all responsibilities required under the Job Title including: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Signature: \_\_\_\_\_ Initials: \_\_\_\_\_ Date: \_\_\_\_\_

TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

**Master Trial Schedule**

SOP Number: A.012.09

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To provide a master schedule that shows all trials being conducted by Trevor Nichols Research Center's FRD.

EQUIPMENT DESCRIPTION:

None

PROCEDURES:

The designated personnel that will complete the master trial schedule for Trevor Nichols research Center will refer to the following outlined SOP to ensure the integrity of the trials.

MASTER TRIAL SCHEDULE PROCEDURES:

1. The Master Trial Schedule shall contain the following information: (see the attached sheet)
  - Coded test substance
  - Trevor Nichols Research Center assigned residue number
  - Sponsor identity number
  - Test system (crop)
  - Nature of study (R)
  - Sponsor Study Director
  - Current status – Active (A); Inactive (I); Field portion completed (FPC)
  - Test initiation date
2. The Master Trial Schedule will be maintained by Trevor Nichols Research Center personnel.
3. A copy of the original Master Trial Schedule will be available at the Trevor Nichols Research Center for the contracted Quality Assurance Unit.
4. Any updating of information to the Master Trial Schedule will be given to the Quality Assurance Unit, so they may update their schedule.
5. The Master Trial Schedule will be archived at IR-4 Headquarters upon completion of field season.



TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

Weather Data

SOP Number: A.013.08

Revision Date: 3/15/2022

Effective Date: See approved by RFC date



PURPOSE:

To provide weather data that is necessary as raw data for GLP field residue trials.

EQUIPMENT DESCRIPTION:

Enviro-Weather is an on-site weather station at various locations throughout Michigan.  
([www.agweather.geo.msu.edu/mawn/](http://www.agweather.geo.msu.edu/mawn/))

PROCEDURES:

The designated personnel that will conduct the weather monitoring for field residue studies will refer to the following outlined SOP to ensure the integrity of the weather data.

WEATHER DATA PROCEDURES:

1. Weather data will be obtained from Enviro-Weather Station located closest to the trial location (Example: Trevor Nichols Research Center located in Fennville, and Clarksville Horticultural Experiment Station located in Clarksville). The weather data is downloaded to the Enviro-Weather website where the data can be exported in the form of a report, or excel datasheet.
2. The weather station location will reasonably reflect the climatic conditions of the residue trials that are conducted on orchards and plantings.
3. The data will be retained and filed in the archives.
4. The Michigan State University Department of Geography/ Climatologists are responsible for the maintenance, repair, or calibration of the weather station along with archiving all records.

TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

EPA Audit or Inspection

SOP Number: A.014.09

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To establish a procedure, to be followed when the EPA provides an advance noticed of an inspection/audit of contracted study done at Trevor Nichols Research Center, Michigan State University.

EQUIPMENT DESCRIPTION:

None

PROCEDURES:

The designated personnel that will participate in an EPA audit or inspection will refer to the following outlined SOP to ensure the integrity of the study.

EPA AUDIT OR INSPECTION PROCEDURES:

1. Upon notification of an inspection/audit by the EPA and/or the company for which the study was done, the Quality Assurance Unit will be notified immediately by phone, and will follow up by sending a copy of the Notice of Inspection.
2. Communication will be made with the company whose study is being inspected/audited; to make sure they are aware of the visit.
3. Raw data reviewed and set aside for the audit/inspection by study personnel will be placed in the archives.
4. Upon arrival at Trevor Nichols Research Center, the inspector will be met by the Field Research Director.
5. If a non-compliance issue is raised by the EPA inspector that can be readily resolved, then the study personnel should take steps to correct the deficiency and to inform the inspectors.
6. All inspection activities will be coordinated by the Field Research Director or other designated study personnel for the duration of the inspection/audit.
7. All Trevor Nichols Research Center study personnel will be cooperative and respond positively to specific request and questions posed by the auditor.
8. Information will be gathered as to how the inspectors wish to proceed with their activities, and a timetable determined for those activities.
9. Trevor Nichols research Center's policy is that cameras and recorders are not to be used on the premises without expressed written permission for each occasion.
10. Notes will be taken of the procedures watched and documented requested.

11. Whenever possible, the EPA inspector's request will be accommodated, provided that the request is reasonable and is required under current regulations, or in the "spirit of the law".
12. Study personnel will provide the EPA auditors photocopied documents where appropriate. Duplicated copies will be made, retaining one copy for our Quality Assurance records.
13. The Field Research Director will check credentials, badge numbers, and office addresses and record this information. The Field Research Director will accept the "Notice of Intent to Inspect" and request the specific purpose of the visit.
14. At the exit interview, the auditor will discuss their findings and discuss timetable for response to findings.
15. At the unannounced audit/inspections, if appropriate study personnel are not available, the audit team will be asked to return at a later date.

TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

Sponsor Visit or Audit

SOP Number: A.015.09

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To establish a procedure, to be followed when a Sponsor provides an advance notice of an inspection/audit of contracted study or facilities at the Trevor Nichols Research Center, Michigan State University.

EQUIPMENT DESCRIPTION:

None

PROCEDURES:

The designated personnel that will participate in a Sponsors visit or audit will refer to the following outlined SOP to ensure the integrity of the study.

SPONSOR VISIT OR AUDIT PROCEDURES:

1. The Master Trial Schedule, a copy of appropriate SOP's, C.V.'s, training records, organizational chart, or other pertinent materials, will be sent to the Sponsors representative upon request.
2. The Field Research Director and/or other appropriate Trevor Nichols Research Center personnel will meet the Sponsor representative at the designated time and date.
3. All Trevor Nichols Research Center personnel will be cooperative and respond positively to specific request and questions posed by the Sponsor representative.
4. Information will be gathered to determine what areas will be inspected and/ or audited, and the time table determined for those activities.
5. At an exit interview, a copy of written findings will be requested, and an appropriate response will be made as requested by the Sponsor. A copy of these findings and the response will be provided to the Quality Assurance Unit.

TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

Rounding Off Numbers

SOP Number: A.016.10

Revision Date: 4/20/2018

Effective Date: See approved by RFC date

PURPOSE:

To ensure when calculations are being done for residue calculation and calibration sheets, there is a rounding off procedure to follow.

EQUIPMENT DESCRIPTION:

None

PROCEDURES:

The designated personnel that will conduct the rounding of numbers will refer to the following outlined SOP to ensure the integrity of the data.

ROUNDING OFF NUMBERS PROCEDURES:

1. Calculations done for the residue calculation sheet (SOP A.018.07) and Calibration sheet (SOP M.005.17) will be carried to 2 decimals; except for the final "test substance per plot" the value will be carried only to one decimal point.
2. If the first digit to be dropped is less than 5, round down. For example, 0.434 is rounded to 0.43.
3. If the first digit to be rounded is 5 or greater round up. For example, 0.258 is rounded to 0.26.



TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

Developing the Residue Calculation Sheet

SOP Number: A.018.07

Revision Date: 4/20/2018

Effective Date: See approved by RFC date

PURPOSE:

Record all needed information from the research protocol, SOP M.005.18 and Field Data Books to a form usable for personnel measuring and applying experimental products.

EQUIPMENT DESCRIPTION:

The appropriate Field Data Book, protocol, and the Residue Calculation Sheet (See the attached sheet) will be used.

PROCEDURES:

The designated personnel that will conduct the developing of the residue calculation sheet will refer to the following outlined SOP to ensure the integrity of the data.

DEVELOPING THE RESIDUE CALCULATION SHEET PROCEDURES:

1. Using the Residue Calculation Sheet (see attached sheet), record the following information from the sponsored protocol:
  - A. The trial number, product name, formulation of the treatment chemical, and protocol rate.
  - B. The assigned treatment number and the application timing.
2. Using the Residue Calculation Sheet (see attached sheet), record the following information from the assigned Field Data Book:
  - A. The plot information for the selected treatment site, including the orchard, crop, plants per treatment (Plants/Trt.), width between the rows in feet (Row Width), plant spacing within the row in feet (Plant Spacing), and the target gallons of spray water per acre (GPA).
3. Using the Residue Calculation Sheet (see attached sheet), record the following information from the sponsored protocol to determine the amount of formulated treatment chemical to be used per acre (Form. Prod./Acre) by one of the following: (Note that all Form. Prod./Acre and Form. Prod./Tank values will be converted into metric units during the residue process.)
  - A. Use the amount of Form. Prod./Acre specified in the protocol.
  - B. If the rate is specified as amount of active ingredient per acre, calculate the Form. Prod./Acre as follows:

$$\text{Form. Prod./Acre} = \frac{\text{Rate of Active Ingredient per Acre}}{\text{Amount of Active Ingredients per Unit of Form. Prod.}}$$

4. Use of the Calibration Sheet (SOP M.005.18) to determine and record to the Residue Calculation Sheet the gallons per minute per side (GPM) from:
- The Average Amount of water to refill sprayer tank (Ave. Amount to Refill), Average time sprayed (Ave. Time Sprayed) and 60.0 seconds.
  - All values are transcribed from the most recent Calibration Sheet (SOP M.005.18) and for the appropriate application and treatment.

$$\text{GPM} = \frac{\text{Ave. amount to refill} \times 60.0 \text{ seconds}}{\text{Ave. time sprayed}}$$

5. Use the Calibration Sheet (SOP M.005.18) to determine and record to the Residue Calculation Sheet the gallons per Acre (GPA) from:
- The Average Amount to refill, Average Time Sprayed, Square Feet per Acre, Swath width, Course length and Average Time to Travel the Course.
  - All values are transcribed from the most recent Calibration Sheet (SOP M.005.18) and for the appropriate application and treatment.

$$\text{GPA} = \frac{\text{Ave. amount to refill} \times \text{Ave. Time Sprayed} \times 43560 \text{ SQ FT/A}}{\text{Swath Width/Course Length/Average Time to Travel}}$$

6. Use the Calibration Sheet (SOP M.005.18) and Residue Calculation Sheet (see attached sheet) to determine and record to the Residue Calculation Sheet the amount of water in the spray tank (Tank Solution) to be used for this application form:
- The Gallons per Acre (GPA), Plants per Treatment (Plants/Trt.), Row Width, Plant Spacing, and Square Feet per Acre.
  - All values are transcribed from the most recent Calibration Sheet (SOP M.005.18) and the Residue Calculation Sheet (see attached sheet) for the appropriate application and treatment.

$$\text{Tank Sol.} = \frac{\text{GPA} \times \text{Plants/Trt.} \times \text{Row Width} \times \text{Plant Spacing}}{43560 \text{ SQ FT/A}} + * \text{Primer}$$

\*The amount of water to keep sprayer in operation

7. Using the Residue Calculation Sheet (see attached Sheet) determine the amount of product to be used for the appropriate treatment from:
- The Formulated Product per Acre (Form. Prod./Acre), gallons of water in tank and the Gallons per Acre (GPA).
  - All Values are transcribed from the most recent Calculation Sheet (see attached sheet) and for the appropriate application and treatment.

$$\text{Amount of Product} = \frac{\text{Form. Prod./Acre} \times \text{Gallons in Tank}}{\text{GPA}}$$

8. The researcher or calibrator will check all the values and calculations to verify the accuracy. The researcher or calibrator will sign and date the Residue Calculation Sheet and the day of completion.
9. The original Residue Calculation Sheet will be placed into the appropriate Field Data Book and a copy will be made and placed in the on-site logbook and archived appropriately and timely. All raw data will be recorded and archived according to SOP A.004.12 (Recording of Raw Data).

**Residue Calculation Sheet**

Trial Number: \_\_\_\_\_

Product Name: \_\_\_\_\_ Formulation: \_\_\_\_\_ Protocol Rate: \_\_\_\_\_

Treatment Number: \_\_\_\_\_ Application Number: \_\_\_\_\_

Treatment Number: \_\_\_\_\_ Application Number: \_\_\_\_\_

\_\_\_\_\_ A.I./Acre \_\_\_\_\_ = \_\_\_\_\_ Form. Prod./Acre

**Plot Information:**

Plants/Trt.		Crop:
Row Width	(ft)	Orchard:
Plant Spacing	(ft)	Target GPA:

**Information from Calibration Sheet**

**One Side Delivery**

**Spray Rate:**

GPM=Ave. Amount to Refill \_\_\_\_\_ (gal)/ Ave. Time Sprayed \_\_\_\_\_ (Sec) x 60.0 (sec)= \_\_\_\_\_ GPM

GPA=  $\frac{\text{Ave. Amount to Refill} \text{ (gal)} \times \text{Ave. Time Sprayed} \text{ (sec)} \times 43560 \text{ Sq. Ft./Acre}}{\text{Swath Width} \text{ (ft)} / \text{Course Length} \text{ (ft)} / \text{Ave. Time Traveled} \text{ (sec)}}$

=GPA \_\_\_\_\_

**Tank Solution:**

$\frac{\text{GPA} \times \text{Plant/Trt.} \times \text{Row Width} \text{ (ft)} \times \text{Plant Spacing} \text{ (ft)}}{43560 \text{ Sq. Ft. / Acre}}$

= \_\_\_\_\_ (gal) + Primer \_\_\_\_\_ (gal) = \_\_\_\_\_ (gal) Tank Solution

**Amount of Product:**

Trt. # \_\_\_\_\_ App. # \_\_\_\_\_ : Form. Prod. / Acre \_\_\_\_\_ x Gal. in Tank \_\_\_\_\_ / GPA \_\_\_\_\_

= Amount of Product \_\_\_\_\_

Signature: \_\_\_\_\_ Calculation Date: \_\_\_\_\_

TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

**Data archiving, retention, and Quality Control Review**

SOP Number: A.019.02

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To ensure that data collected from a field trial is archived at IR-4 Headquarters and at Michigan State University Trevor Nichols Research Center IR-4 Field Office.

DATA ARCHIVING, RETENTION AND QUALITY CONTROL REVIEW PROCEDURES:

1. The official archive for original raw data will be located at IR-4 Headquarters.
2. The Field Research Director or GLP Coordinator will make an exact copy of the original raw data including completed Field Data Books, logs, weather data, personnel forms, etc. These copies will be retained in a secure location at Michigan State University Trevor Nichols Research Center IR-4 Field Office.
3. All information in the Field Research Director's file should be clearly identified.
4. All original raw data not included in a Field Data Book (e.g. logs, weather data, personnel forms, etc.) will be archived at Michigan State University Trevor Nichols Research Center IR-4 Field Office.
5. All completed Field Data Books will be submitted to the Regional Field Coordinator to review for completeness and accuracy. The Regional Field Coordinator or designee will follow up to obtain any missing data or correct deficiencies with the Field Research Director's consent.
6. The Field Research Director or GLP Coordinator will add any additional or changed pages to the Field Data Book copy on file and these updated pages will be used for all subsequent quality assurance audits.

TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

Using Borrowed Equipment

SOP Number: A.020.01

Revision Date: 4/20/2018

Effective Date: See approved by RFC date



PURPOSE:

Contains information on the procedures for borrowing or leasing any equipment for use in IR-4 GLP trials.

USING BORROWED EQUIPMENT PROCEDURES:

1. If the current piece of equipment is not working properly, disabled, broken, or is in a location of desired field location for trial (differentiation between trials), a similar or equivalent piece of adequate equipment may be borrowed or leased from another source.
2. Make sure that the proper GLP equipment form is filled out to include the: equipment ID (serial #, brand, and make/model) and trial ID which the equipment is used for. This form will be placed in the logbook.
3. Any maintenance and calibrations will be recorded in SOP M.001.15, M.004.12, and M.005.17.

Date equipment borrowed /Initials of Borrower	
Date equipment borrowed/ Initials of whom borrowing from	
Equipment ID (Serial #, Make/ Model)	
Trial ID the Equipment is used for	
Use of the equipment	
Date equipment returned/ Initials of Borrower	
Date equipment returned/ Initials of whom borrowing from	

Date equipment borrowed /Initials of Borrower	
Date equipment borrowed/ Initials of whom borrowing from	
Equipment ID (Serial #, Make/ Model)	
Trial ID the Equipment is used for	
Use of the equipment	
Date equipment returned/ Initials of Borrower	
Date equipment returned/ Initials of whom borrowing from	

Date equipment borrowed /Initials of Borrower	
Date equipment borrowed/ Initials of whom borrowing from	
Equipment ID (Serial #, Make/ Model)	
Trial ID the Equipment is used for	
Use of the equipment	
Date equipment returned/ Initials of Borrower	
Date equipment returned/ Initials of whom borrowing from	

Date equipment borrowed /Initials of Borrower	
Date equipment borrowed/ Initials of whom borrowing from	
Equipment ID (Serial #, Make/ Model)	
Trial ID the Equipment is used for	
Use of the equipment	
Date equipment returned/ Initials of Borrower	
Date equipment returned/ Initials of whom borrowing from	

TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

Site Selection for GLP Field Trials

SOP Number: A.021.01

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To ensure that the test site is appropriate and adequate to obtain the required data or samples with sufficient uniformity to meet EPA and protocol requirements.

PROCEDURES:

1. The IR-4 facility in Fennville, Michigan is located at the Trevor Nichols Research Center (TNRC), an extension center of Michigan State University's College of Agriculture and Natural Resources. The outlying agricultural research stations provide facilities for MSU scientists to conduct field experiments under the state's various agricultural conditions. The following sites are available for (but not limited to) use in IR-4 field research trials:
  - a. Trevor Nichols Research Center  
6237 124<sup>th</sup> Ave.  
Fennville, MI 49408
  - b. Clarksville Research Center  
9302 Portland Rd  
Clarksville, MI 48815
2. Site selection will be made in accordance with the agronomic practices acceptable for the crop and capacity to simulate commercial conditions.
3. Trials may be conducted off Michigan State University property if necessary.
4. Each site shall be large enough to accommodate the required number of samples, buffer zones and treatments in accordance with an approved research protocol and for the commodity to be grown under simulated commercial conditions yielding samples of sufficient size for analysis where required.
5. Locate site with sufficient isolation to minimize contamination from external sources such as commercial operations or other research studies. Minimum distance between plots of similar chemistries and/or untreated plots shall be followed as per protocol.
6. If the commodity is not to be newly established, a site shall be selected that has a uniform stand for production.
7. Standard cultural practices shall be performed prior to plot layout and marking.
8. The experimental design, if specified by the research protocol, shall be used.
9. Lay out each plot on the site using a suitable measuring device to accurately locate plots on the site. Measure from a permanent field marker to the closest corner of the plot. From there, measure to the next corner of the plot and then to another permanent marker. Measure the length of the plot. Measure the buffer zones between plots to assure acceptable space will exist between plots. In the field data book, record the date the plots were laid out and the initials of the individual responsible for laying out the plots.
10. Prepare a plot map showing the location of each plot on the GLP trial site, approximate direction and degree of slope, and the north direction. The map should show the number of rows/beds and their direction, row spacing, tree spacing if applicable, row length, overall plot dimensions, distance from treated and untreated plot, and the distance from the farm entrance to the plot and location and dimensions of the buffer zones. The plot map shall contain distance from plots to permanent markers.
11. The plots involved in GLP field trials shall be identified with a unique number and marked at the beginning and ending of each row used in the trial with a labeled stake or similar.

12. Identify each treatment plot as per the protocol including, but not limited to, the IR-4 field ID number and treatment number or treatment name. The marker shall be made in such a manner that it will be visible throughout the life of the trial.
13. The soil where the trials will be conducted shall be tested for nutrients, pH, and organic matter every 5 years and the above data will be recorded in the file for all trials at that location.

TREVOR NICHOLS RESEARCH CENTER

MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

**Receipt, Storage, and Disposal of Test Substance**

SOP Number: C.001.21

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To ensure that the GLP test substance is received, stored to ensure integrity, and disposed of properly.

PROCEDURES:

The designated personnel who will conduct the Receipt, Storage, and Disposal of Sample Test Substance procedures will refer to the following outlined SOP and Equipment Manuals for the Hobo temperature alarm system.

RECEIPT AND STORAGE OF TEST SUBSTANCE PROCEDURES:

1. Upon the receipt of a GLP test substance, personnel will initial and date the container, and assign a container ID (example: 12972.21-MI193) and record it on the container and in the field data book test substance receipt log. If the trial has multiple test substance containers, each container will be identified with a different container ID (example: 12972.21-MI193 Cont. #1, 12972.21-MI193 Cont. #2). Personnel will verify that the test substance GLP status, expiration date, and storage conditions are known, and if not known, immediately contact the study director.
2. If test substance arrives before a temperature monitoring system is activated in the IR-4 Storage Cabinet, the test substance will be placed in the facility office (up to 2 days) until the temperature system is activated, at which time the test substance will be placed in the IR-4 storage cabinet.
3. All test substance information will be logged into the IR-4 Field Data Book test substance receipt log and test substance record use log (Part 4A, and Part 4B of the FDB).
4. Shipping papers (ex: COA, SDS) received with test substance will be placed in Field Data Books.
5. All test substances will be kept in the IR-4 Chemical Storage Cabinet in their original containers. The IR-4 Chemical Storage Cabinet is inside the Pesticide Storage Room. The Pesticide Storage Room is heated and properly ventilated. The IR-4 Storage Cabinet is locked and temperature monitored by HOBBO and min/max thermometer.
6. Refer to the test substance label, COA, or SDS for specific handling and storage conditions.
7. The HOBBO temperature monitor will be activated in the IR-4 Chemical Storage Cabinet within 2 days of test substance receipt. The Hobo temperature monitor will be programmed to record constant real time temperatures at least once every hour.
8. Empty containers can be disposed of if a study was canceled or the report has been signed by the Study Director, unless test substance was used in a study that has not yet been completed.

TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

Measuring Liquid Chemicals

SOP Number: C.002.11

Revision Date: 4/20/2018

Effective Date: See approved by RFC date



PURPOSE:

To ensure that accurate measurement of liquid chemicals is made before mixing and use for a residue trial.

EQUIPMENT DESCRIPTION:

Use appropriate graduated cylinder to measure liquid chemicals or if needed, disposable syringes for small amounts. Chemical resistant gloves should be worn.

PROCEDURES:

The person measuring the test substance will follow the following SOP to guarantee the precise amount and the right test substance is being measured that corresponds with the trial.

MEASURING LIQUID CHEMICAL PROCEDURES:

1. The measuring device should be graduated in increments small enough to read to accuracy within +/- 2.0% of the total volume being measured.
2. Make sure the graduated cylinder is on a level surface. Always wear chemical resistant gloves when measuring out test material.
3. Measure the required amount of liquid into the graduated cylinder to where the bottom of the meniscus is at the desired amount. Record the amount removed from the test substance container to the Field Data Book and the Test Substance Receipt and Removal Log (SOP C.001.21).
4. If using disposable syringe, draw the liquid up the barrel past the desired amount, and push on the syringe plunger until the test substance meniscus is at the desired amount. Make sure the reading is taken at the bottom of the meniscus. Record the amount removed from the test substance container to the Field Data Book and the Test Substance Receipt and Removal Log (SOP C.001.21).
5. Walk the graduated cylinder to the spray tank holding area; follow SOP M.013.10 for proper tank filling procedures. With liquid test substance, a separate container must have a pre-measured amount of water to ensure graduated cylinder is rinsed.
6. Pour the total amount of product into the appropriate tank. Using the pre-measured water, rinse the graduate cylinder to remove all the test substance.
7. At the completion of each residue trial, the log will be retained and filed as raw data and archived.

TREVOR NICHOLS RESEARCH CENTER

MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

**Sartorius ENTRIS3202-1SUS Balance Calibration**

SOP Number: C.003.13

Revision Date: 5/7/2020

Effective Date: See approved by RFC date

PURPOSE:

This Standard Operation Procedure is intended to outline the calibration of the Sartorius ENTRIS3202-1SUS Balance and general maintenance for the balance.

EQUIPMENT DESCRIPTION:

The balance should be operated on a level, vibration free, solid support surface away from drafts. The balance and weighing pan should be kept clean. Never weigh chemicals directly onto pan. If the balance is stored, make sure it is placed in a case designed to protect it from damage.

EQUIPMENT NEEDED FOR CALIBRATION:

1. Calibrated and verified Standard Mass Set
2. Forceps or tweezers
3. Latex gloves

PROCEDURES:

Before weighing chemicals for a residue trial, complete the following calibration procedure. If two or more trials are weighed concurrently or sequentially, the calibration needs only be done before the first weighing. Refer to the owner's manual for proper installation and maintenance (SOP M.014.13).

ELECTRONIC BALANCE CALIBRATION PROCEDURES:

1. Turn on balance, and allow machine to reach internal equilibrium according to manufacturer's manual.
2. Select the weighing unit by hitting the MODE key. Choose the weighing unit (example g = grams) that is appropriate for the product that will be weighed.
3. Select two Standard Masses in the range of the chemical to be weighed. Always use forceps or tweezers when handling Standard Masses.
4. Record the following information in the Balance Log: (see attached sheet) Date, test number being weighed. Weight set number, weight of Standard Mass set used, weight measured for each Standard Mass and the initials of the person doing the calibration.
5. If the measured weights of both Standard Masses are within +/- 2% of the Standard Mass Size, proceed with weighing the chemical. See SOP C.004.12.
6. If the measured weight of either the Standard Mass differs by more than +/-2% Standard Mass Size, recalibrate the balance according to manufacturer's operation manual.
7. If after recalibration the measured weight of both Standard Masses is within +/-2% of the Standard Mass Size, record the weight in the Balance Log and proceed with weighing the chemicals.

8. If after recalibration the measured weights of both Standard Masses are not within  $\pm 2\%$ , weigh a third Standard Mass to determine if the problem is the Standard Mass, rather than the balance. If the measured weight of the third Standard Mass is within  $\pm 2\%$  of the Standard Mass Size, record the weights in the Balance Log and proceed with the chemical weighing.
9. If after calibration the measured weights of two of the three Standard Masses differ by more than  $\pm 2\%$  from the Standard Mass Size, record the measured weights in the Balance Log, and do not use the balance for weighing chemicals until it has been professionally replaced.



TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

**Weighing Non-Liquid chemicals on a Sartorius ENTRIS3202-1SUS Balance**

SOP Number: C.004.12

Revision Date: 5/7/2020

Effective Date: See approved by RFC date

PURPOSE:

To outline the procedures used to weigh non-liquid GLP chemicals on the Sartorius ENTRIS3202-1SUS Balance.

EQUIPMENT DESCRIPTION:

The Sartorius ENTRIS3202-1SUS Balance is the standard balance powered by an AC adapter. For installation and maintenance refer to the Equipment Manual. (SOP M.014.13) All disposable containers used in the weighing of residue trials will be clean and have a secure lid for transport to the designated filling area.

PROCEDURES:

The designated personnel that will conduct the chemical weighing for the residue trials will refer to the following SOP and the Equipment Balance. (SOP M.014.13)

WEIGHING NON-LIQUID CHEMICAL PROCEDURE:

1. Scale should be on a flat and level surface free from drafts.
2. Be sure that the power source is properly established.
3. Press the on/off key to turn the balance on. After the power is turned on, a test of all essential functions will run automatically. The self-test ends with an appropriate read-out obtained from the program code setting. (Example 0.0g)
4. Place the container in which the non-liquid test substance will be measured on the balance, then press the re-zero control to zero the display.
5. After the display shows 0.0, measure the appropriate test substance until the required amount is reached. Record the amount removed from the test substance container into the Field Data Book and the Test Substance Receipt and Transfer Log.
6. Seal the disposable container in which the test substance was weighed, and proceeds to weigh out the next desired amount following the above steps.
7. Written on the container top will be the PR number, amount of test substance and the name of the test substance.
8. Carry the sealed test substance to the spray tank holding area; follow (SOP M.013.09) for proper tank filling procedures and pour the test substance into the prefilled spray tank.

TREVOR NICHOLS RESEARCH CENTER  
MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

Receipt, Storage, Use, and Disposal of Adjuvants

SOP Number: C.005.04

Revision Date: 5/5/2023

Effective Date: See approved by RFC date



PURPOSE:

To ensure that adjuvants used in GLP residue trials are received, stored to ensure integrity, and disposed of properly.

PROCEDURES:

The designated personnel that will conduct the Receipt, Storage, Use, and Disposal of Adjuvant procedures will refer to the following outlined SOP and Equipment Manuals for the Hobo temperature system.

RECEIPT, STORAGE, USE AND DISPOSAL OF ADJUVANT:

1. All adjuvants for GLP studies will meet GLP labeling requirements including, but not limited to:
  - a. Adjuvant Name
  - b. Concentration
  - c. Batch or Lot Number
  - d. Storage conditions
  - e. Date of purchase or initial opening of container
  - f. Expiration date – If no expiration date is available, the FRD will assign an expiration date of no longer than 5 years from the date of purchase
2. Secondary containers are permitted for storage, but must be properly labeled as per the original container and shall take on all the requirements of the original container. Adjuvant dispensed into a secondary container shall not be returned to the original container.
3. Adjuvants shall be in good condition. The physical characteristics should not have changed since purchase or be compromised. Color, consistency, and odor should be unchanged from purchase. If there are any concerns about the integrity or condition of an adjuvant, it shall be removed from use in GLP studies.
4. Adjuvant storage conditions are in a dry, well-ventilated building, which is separate from offices and laboratories and where fire protection is provided, and protected from freezing or overheating with access limited to authorized personnel. Adjuvants are stored at Trevor Nichols Research Center, Pesticide Mixing Room, IR-4 Storage Cabinet and that is kept locked.
5. Storage temperatures shall be recorded using a Hobo data logger. Hobo data logger shall be downloaded periodically. A min/max thermometer shall be kept as a backup.
6. Adjuvants shall be handled in a manner to prevent cross-contamination with any other substances. Adjuvants shall be dispensed from the original container or secondary container using a factory sealed disposable syringe or pipette or by pouring directly into a measuring device such as a beaker or graduated cylinder. Syringes or pipettes shall not be used again for adjuvant or test substance and shall be properly disposed of. It is imperative that no measuring device will be used to dispense from an original or secondary adjuvant container, placed onto a mix tank and used to dispense from the adjuvant container again. Measuring devices such as

beakers and graduated cylinders shall be cleaned by washing with a bottle brush and soap, and triple rinsing with acetone and let air dry.

7. Empty containers will be properly disposed of by triple rinsing and rendering the container unusable.

TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

**Maintenance and Cleaning of Airblast Sprayers**

SOP Number: M.001.15

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To ensure that the airblast sprayers are free from contaminants and running at optimum performance for accurate application.

PROCEDURES:

The designated personnel that will conduct the maintenance and cleaning of the airblast sprayers will refer to the following SOP and equipment manuals (SOP M.014.14).

CLEANING OF THE AIRBLAST SPRAYERS PROCEDURES:

1. Before applying any test substance or when changing compounds or formulations, the spray tank will be cleaned by triple rinsing with clean water.
2. The spray system will be flushed with clean water according to SOP M.005.17. Whirl plates and ceramic disks will be checked for debris and cleaned if necessary.
3. If necessary, the exterior of the sprayer will be cleaned with a high pressure washer and soap.
4. The designated personnel conducting the cleaning of the airblast sprayer will record all procedures done to the sprayer in the Application Equipment and Maintenance Log Sheet (see attached sheet).

ROUTINE MAINTENANCE OF THE AIRBLAST SPRAYERS PROCEDURES:

1. The designated personnel maintaining the airblast sprayer will conduct the appropriate routine maintenance according to the operating manual (see SOP M.014.14).
2. A visual inspection will be conducted of the airblast sprayer to ensure it is functioning properly.
3. The designated personnel conducting routine maintenance of the airblast sprayer will record all routine procedures done to the sprayer in the Application Equipment and Maintenance Log Sheet (see attached sheet).

NON-ROUTINE MAINTENANCE OF THE AIRBLAST SPRAYERS PROCEDURES:

1. In case of non-routine maintenance to the airblast sprayer, action will be taken at the research facility to rectify the malfunction or failure.
2. If the repairs cannot be corrected by the designated personnel, then an outside source will be contacted to repair the malfunction at the research facility.
3. If repairs cannot be done at the research facility, outside professionals will be contacted and the equipment will be transported to such professionals for repair.
4. The designated personnel conducting non-routine maintenance of the airblast sprayer will record all non-routine procedures done to the sprayer in the Application Equipment and Maintenance Log Sheet (see attached sheet).



TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

Verification of GPI Electronic Digital Water Meter

SOP Number: M.003.12

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

This Standard Operating Procedure outlines the steps to be taken to calibrate the GPI Electric Digital Water Meter and the re-check procedures used.

EQUIPMENT DESCRIPTION:

The GPI Electronic Digital Water Meter is a battery powered meter that is designed for measuring water flow. The 5.00 gallon Large Calibration Container is a calibrated container use to measure the amount of water that has flowed out of the digital meter. For use and calibration refer to the equipment manuals in the black equipment manuals folder located in the TNRC archive office or equivalent online (SOP M.014.13).

PROCEDURES:

The designated personnel that will conduct the field calibration and re-check procedure of the digital water meter will refer to the following outlined SOP and the equipment manual (SOP M.014.13). The field calibration of the GPI Electronic Digital Water Meter will be done yearly prior to beginning of residue trials and re-checked the day of any residue trail.

FIELD CALIBRATION PROCEDURES:

1. Place the 5.00 gallon large calibration container on a level surface.
2. Run water through the meter to check for any leaks and to ensure meter is working properly. Refer to the electronic digital water meter owner's manual for field manufacture calibration procedures.
3. Follow the Dispense-Display Field Calibration Procedures in the owner's manual for proper field calibration. Start filling the calibrated 5.00 gallon Large Calibration Container making sure that the water is dispensed at full flow.
4. As the water rinses in the container, try stopping the water flow at the 5.00 gallon mark, making sure that flow stopped as quickly as possible. Once the water has been shut off, read the actual container amount.
5. Record the actual reading from the container into the Field Calibration Water Meter Verification Sheet (see attached sheet). The original Field Calibration Water Meter Verification sheet will be logged into the on-site log book and archived according to SOP A.004.12.
6. Clear the water meter readout and empty the container and place it back on the level surface. With this SOP, procedure 2 -6 must be repeated to achieve field calibration average output.
7. During the field calibration procedure, if any one data point is more than a  $\pm 5\%$  error from the mean (the average of the three calibration runs) then an explanation will be required to ensure the accuracy of the calibration.
8. If an explanation cannot ensure the integrity of the calibration, a new field calibration will be done to achieve the most accurate calibration for the meter.

RECHECK FIELD CALIBRATION PROCEDURES:

1. Place the large 5.00 gallon calibrated container on a level surface.
2. Using the calibrated meter, fill the 5.00 gallon Large Calibration Container, read the digital display from the meter, stopping the flow exactly at 5.00 gallons as quickly as possible.
3. Record the amount of water in the 5.00 gallon Large Calibration Container to the re-check log sheet (see attached sheet). If the re-check is within  $\pm 5\%$  of the calibrated meter then no further re-checks are needed. If the re-check is out of the  $\pm 5\%$  range, a new field calibration will be done.
4. Record the date, initials, target volume, and the amount to refill on the Re-Check Log Sheet.



**Field Calibration  
Water Meter Verification Sheet**

Date: \_\_\_\_\_

Meter Name: \_\_\_\_\_

Location of the Meter: \_\_\_\_\_

Calibrated Container Volume: \_\_\_\_\_

Reading from the Calibrated Meter:

Reading 1: \_\_\_\_\_

Reading 2: \_\_\_\_\_

Reading 3: \_\_\_\_\_

Average: \_\_\_\_\_

Error and Percent Error Calculations:

Error=Experimental value \_\_\_\_\_ - Target Value \_\_\_\_\_ = \_\_\_\_\_ Error

Percent Error=Error \_\_\_\_\_ / Target Value \_\_\_\_\_ \* 100 = \_\_\_\_\_ Percent Error

Signature and Date of the Personnel Calibrating the Meter

\_\_\_\_\_



TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

**Maintenance of Farm Tractors**

SOP Number: M.004.13

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To ensure that the tractors are running at optimum performance for accurate application.

PROCEDURES:

The designated personnel that will conduct the maintenance and cleaning of the farm tractor will refer to the following SOP and the equipment manual (SOP M.014.14) to ensure the integrity of the equipment.

ROUTINE MAINTENANCE OF FARM TRACTOR PROCEDURES:

1. The designated personnel that will maintain the farm tractors used for GLP field residue work will conduct the appropriate routine maintenance according to the operating manuals. See SOP M.014.14 for designated personnel and the operating manuals needed.
2. A visual inspection will be conducted of the farm tractors to ensure the tractors working mechanisms are in satisfactory conditions. Some examples of these mechanisms are the belts, hoses, tire pressure, PTO drive, and 3-point hitch.
3. A visual inspection of the cab will be conducted to ensure all gauges, controls, and all safety equipment is in satisfactory condition.
4. The exterior of the farm tractors will be cleaned as needed with a high pressure washer.
5. The designated personnel conducting the routine maintenance of the farm tractors will record all procedures done to the tractors in the Tractor Maintenance Log Sheet (see attached sheet).

NON-ROUTINE MAINTENANCE OF FARM TRACTORS PROCEDURE:

1. In case of non-routine maintenance to the farm tractors, action will first be taken to rectify the malfunction or failure .
2. If the repairs cannot be corrected by the designated personnel, then an outside source will be contacted to repair the malfunction at the research facility
3. If repairs cannot be done at the research facility, outside professionals will be contacted and the equipment will be transported to such professionals for repair.
4. The designated personnel conducting non-routine maintenance of the tractor will record all non-routine procedures done to the tractor in the Tractor Maintenance Log Sheet (see attached sheet).



TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

**Calibration of Airblast Sprayers**

SOP Number: M.005.18

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To provide a uniform procedure for the calibration of Airblast Sprayers to ensure accurate applicaion.

PROCEDURES:

The designated personnel conducting the field calibration will follow SOP's M.014.14 (Designated Personnel), M.001.15 (Maintenance and Cleaning of Airblast Sprayers), and M.004.13 (Maintenance of Farm Tractors) to ensure accurate calibration of the airblast sprayer.

DISCHARGE CALIBRATION OF AIRBLAST SPRAYERS PROCEDURE:

1. The designated personnel will use the FMC manual to select the optimum pressure setting, tips, whirl plate, nozzle positions, and RPM to obtain the GPA needed per protocol. The nozzle selection should be targeted for adequate coverage. Ceramic disk and whirl plate numbers will be selected and recorded on the Calibration Worksheet (see the attached sheet).
2. One tank will be used throughout the calibration and application. The designated personnel will use the calibrated electronic digital water meter (SOP M.003.12) to fill the tank to the level full and record the amount of water to fill the tank on the Calibration Worksheet (see the attached sheet). The sprayer will then be driven away from the spray pad and parked with the parking brake on and tractor in neutral to begin the calibration sequence by selecting the proper RPM.
3. The tank and return line are used for discharge calibration and application. With the tank ready and at the proper RPM, the manifold is engaged and timed for 60.00 seconds, or per protocol. While the sprayer is running, the pressure gauge is monitored. When the desired time is reached, the manifold is switched off, RPM's are lowered, and the sprayer is driven back to the spray pad to record the PSI, RPM, and the amount of time sprayed on the Calibration Worksheet.
4. The calibrated water meter is then used to fill the tank to the level full and the amount of water needed to refill the tank is recorded on the Calibration Worksheet (see attached sheet).
5. A total of three discharge calibration runs are preformed to get an average discharge rate. If there are any equipment malfunctions during any of the calibration runs or if the discharge rate of any one run is outside of 5% of the mean, then action must be taken to rectify the problem and a new 3 run discharge calibration is required.

Discharge Rate Calculations:

$$\text{GPM} = (\text{Amount to Refill Tank} \underline{\hspace{2cm}} \text{ gal} / \text{Time Sprayed} \underline{\hspace{2cm}} \text{ sec}) \times 60.0 \text{ sec/min} =$$

                                 GPM

Speed Calibration Procedure:

1. The designated personnel will determine target MPH. Measure a course of 220 feet (or distance needed per protocol). The course will be measured and a marker will be placed at each end of the course. The course should represent similar terrain of the actual plot.
2. Tractor is driven to the pre-measured course and gear and RPM are selected. The course is driven, and the timer is started at the first marker and stopped when reaching the second marker.
3. Record the time, gear selection, distance of course, and RPM's used onto the Calibration Worksheet (see attached sheet). Calculate the speed as follows:

$$\text{Speed} = (\text{MPH}) = \frac{\text{distance in feet for pre-measured course}}{\text{(time in seconds recorded to travel course)}} \times \frac{3600\text{sec}}{1 \text{ hour}} \times \frac{1 \text{ mile}}{5280 \text{ ft}}$$

6. A total of three calibration runs are required to get an average speed calibration rate. If there are any equipment malfunctions during any of the calibration runs or if the speed MPH of any one run is outside of 5% of the mean, then action must be taken to rectify the problem and a new 3 run discharge calibration is required.
7. The original Calibration Worksheet will be placed into the appropriate Field Data Book, and a copy will be made and placed in the on-site logbook.



Trial ID: \_\_\_\_\_ Appl. #: \_\_\_\_\_ Date: \_\_\_\_\_ Time: \_\_\_\_\_ Initials: \_\_\_\_\_

1. Select the optimum pressure, whirl plate, ceramic disk, nozzle positions, and RPM to obtain the target GPA and to ensure good coverage.

2.

3. Ceramic disks/whirl plates: (one side, top to bottom)

Nozzle #	Ceramic Disk	Whirl Plate
1		
2		
3		
4		
5		
6		

4. Pressure = 1. \_\_\_\_\_ psi  
 2. \_\_\_\_\_ psi  
 3. \_\_\_\_\_ psi

5. Terrain of calibration course (example: grassy field): \_\_\_\_\_

Speed

1. 2. 3.

1. Tractor RPM \_\_\_\_\_

2. Tractor gear \_\_\_\_\_

3. Distance of course – marker to marker \_\_\_\_\_ (feet)

4. Time to drive course in seconds 1. \_\_\_\_\_ (sec) 2. \_\_\_\_\_ (sec) 3. \_\_\_\_\_ (sec) Ave=

1. \_\_\_\_\_ (mph) 2. \_\_\_\_\_ (mph) 3. \_\_\_\_\_ (mph)

5. Speed (MPH) =  $\frac{\text{(distance in feet for pre-measure course)}}{\text{(time in seconds recorded to travel course)}} \times \frac{3600 \text{ sec}}{1 \text{ hour}} \times \frac{1 \text{ mile}}{5280 \text{ ft}}$

6. Ave. Speed (MPH) = \_\_\_\_\_

Discharge Rate

1. Gallons to fill tank 1. \_\_\_\_\_ (gal) 2. \_\_\_\_\_ (gal) 3. \_\_\_\_\_ (gal)

2. Time Sprayed 1. \_\_\_\_\_ (sec) 2. \_\_\_\_\_ (sec) 3. \_\_\_\_\_ (sec) Ave=

3. Gallons needed to refill tank 1. \_\_\_\_\_ (gal) 2. \_\_\_\_\_ (gal) 3. \_\_\_\_\_ (gal) Ave=

4. Amount to refill tank divided by time sprayed, multiplied by 60.0 seconds.  
 = GPM 1. \_\_\_\_\_ (gal) 2. \_\_\_\_\_ (gal) 3. \_\_\_\_\_ (gal)  
 1. \_\_\_\_\_ (sec) 2. \_\_\_\_\_ (sec) 3. \_\_\_\_\_ (sec)

5. Ave. GPM \_\_\_\_\_ (GPM) 1. \_\_\_\_\_ (gal) 2. \_\_\_\_\_ (gal) 3. \_\_\_\_\_ (gal)

Signature of calibrator and Calibration Date: \_\_\_\_\_

TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

Test Systems Observation, Preparation, and Care

SOP Number: M.008.10

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To ensure that test system area preparation and test system care is provided to have the crop quality maintained at an acceptable level.

EQUIPMENT DESCRIPTION:

None

TEST SYSTEMS OBSERVATION PREPARATION AND CARE PROCEDURES:

1. Cultural Practices
  - a. Provide accepted cultural practices for the particular test system.
  - b. Provide accepted controls for the major pests and diseases that may affect the quality of the test system.
  
2. Rodent Control
  - a. Test system areas will be protected from unacceptable damage caused by rodents.
  - b. Pellets or bait treated with zinc phosphide will be spread in the test system areas according to label rates.

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STANDARD OPERATING PROCEDURES

**Application of Test Chemical with an Airblast Sprayer**

SOP Number: M.013.10

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To provide a uniform procedure for the application of GLP test chemicals to a GLP designated plot with an airblast sprayer to ensure an accurate application.

APPLICATION PROCEDURES:

1. Using the calibrated water meter (SOP M.003.11), fill the tank of the calibrated sprayer with the amount of water as determined by the residue calculation worksheet (SOP A.018.07). Add calculated chemical amount to the tank, and add the calculated adjuvant if necessary according to the label or per protocol. Secure the tank lid, start the tractor, and engage the PTO to start the mechanical agitation.
2. Drive the tractor to the designated test plot. Position the tractor so that the calibrated side manifold is in position to spray one side of the plot row. To achieve MPH and the proper pressure setting, set the tractor to the pre-determined gears and RPMs. Allow sufficient distance before the plot stake to drive the tractor to assure correct MPH and pressure setting.
3. Drive the tractor towards the plot. Begin timing (via stopwatch) and spraying when the sprayer reaches the stake in the beginning of the row. Monitor the pressure gauge and spray pattern to ensure proper coverage. Continue timing and spraying until the sprayer reaches the stake at the other end of the row. Record the pass time in the Field Data Book.
4. Repeat procedure 3 until all sides of all rows of the test plot are sprayed and pass times are recorded.

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STANDARD OPERATING PROCEDURES

**Designated Personnel for Maintenance and Calibration**

SOP Number: M.014.14

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To assure that personnel are designated and responsible for maintenance and calibration of the following equipment as required under GLP regulation 160.63(b).

PROCEDURES:

The designated personnel are responsible for the maintenance and calibration of the following equipment. Designated personnel will have general knowledge of equipment and have access to all equipment manuals, which are located in the black equipment manual notebook located in the TNRC archive office. Personnel will initial and date appropriate data to show who was involved in maintenance and calibration.

EQUIPMENT DESCRIPTION:

- |   |  |
|---|--|
| 1. Sartorius 1 Balance                    | Celeste Wheeler & Kyle Coffindaffer                |
| 2. FMC 1029 Airblast Sprayer              | Celeste Wheeler & Kyle Coffindaffer                |
| 3. FMC 1030 Airblast Sprayer              | Dan Platte & Celeste Wheeler                       |
| 4. REARS AR50 Ariblast Sprayer            | Celeste Wheeler & Kyle Coffindaffer                |
| 5. Hiniker Spray Monitor                  | Celeste Wheeler, Kyle Coffindaffer, and Dan Platte |
| 6. Farm Tractors                          | Celeste Wheeler, Kyle Coffindaffer, and Dan Platte |
| 7. GPI Electronic Digital Water Meter     | Celeste Wheeler, Kyle Coffindaffer, and Dan Platte |
| 8. CO2 Backpack Sprayer                   | Celeste Wheeler & Kyle Coffindaffer                |
| 9. Handgun Sprayer                        | Celeste Wheeler & Kyle Coffindaffer                |
| 10. Hobo Temperature system               | Celeste Wheeler & Kyle Coffindaffer                |
| 11. Kenmore Freezers                      | Celeste Wheeler & Kyle Coffindaffer                |
| 12. Walk-in Cold Storage                  | Celeste Wheeler & Kyle Coffindaffer                |
| 13. Dwyer Wind Meter                      | Celeste Wheeler, Kyle Coffindaffer, and Dan Platte |
| 14. Large Calibrated Container (5.00gal.) | Celeste Wheeler, Kyle Coffindaffer, and Dan Platte |
| 15. Oakton Temp Test/pHydrion dip sticks  | Celeste Wheeler & Kyle Coffindaffer                |
| 16. Cherry Cooling System                 | Celeste Wheeler & Kyle Coffindaffer                |
| 17. PTO Driven Backup Generator           | Celeste Wheeler & Kyle Coffindaffer                |

TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

**Measurement of pH and Water Temperature for Test Substance Application**

SOP Number: M.016.08

Revision Date: 4/26/2021

Effective Date: See approved by RFC date



PURPOSE:

To provide a process for taking the temperature of the water used for test substance application.

EQUIPMENT DESCRIPTION:

The Oakton TempTestr is an electronic water temperature reader.

The pHHydrion instant check dip stick pH tester.

PROCEDURES:

The designated personnel will refer to the following SOP and the Equipment manual (SOP M.014.13) for proper operation of the Yacumama Waterproof Thermometer and Universal pH Test Paper Strips.

WATER TEMPERATURE PROCEDURES:

1. Using a Yacumama Waterproof Thermometer that has been factory calibrated, turn on and place the temperature probe in the same water that was used to carry the test substance.
2. Wait 2-3 seconds for temperature reading. Record the reading that is displayed on the Yacumama Waterproof Thermometer in the Field Data Book.
3. Press off button to turn off.
4. The Yacumama Waterproof Thermometer will be recalibrated following the manufacturer's instructions upon battery replacement.

WATER pH PROCEDURE:

1. Take a small quantity of water from the source that will be used to make the test substance solution.
2. Dip the Universal pH Test Paper Strip into the water solution and remove quickly.
3. Shake off excess water and match with the provided color chart immediately.
4. Enter the pH reading into the Field Data Book.

TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

Cherry Cooling System Calibration

SOP Number: M.018.08

Revision Date: 4/20/2018

Effective Date: See approved by RFC date

PURPOSE:

To assure that a uniform procedure is used for the calibration of the cherry cooling system.

EQUIPMENT DESCRIPTION:

1. The 5 gallon bucket cherry cooling system (SOP R.005.09).
2. Stopwatch
3. Garden hose

PROCEDURES:

Once every 30 days the designated personnel will conduct the calibration and follow SOP's R.005.09 (Cherry Cooling System) and M.014.13 (Designated Personnel) to ensure the proper actions are taken.

CHERRY COOLING SYSTEM CALIBRATION PROCEDURES:

1. There are three different rates of water flowing into the four buckets. All four buckets will use the same rate until the samples are all rinsed. Then the next rate will be used. One rate is flowing at 0.84 gallons per minute (GPM), a second rate is flowing at 0.2 GPM, and a third rate will be flowing at 0.04 GPM. Since we are using 5 gallon buckets with 0.5 gallon measurements on the buckets, there will be 1 gallon calibration procedures used.
2. Using the tarred gallon marks on the sides of the buckets, a stopwatch is used to time the period required to flow a gallon of water into the buckets by adjusting the flow control valves in the system. The time for the rate of 0.84 GPM should be 1.11 minutes for 1 gallon. The time for the 0.2 GPM is 5 minutes for 1 gallon, and the time for the 0.04 GPM rate is 25 minutes for 1 gallon of water.
3. This calibration procedure is conducted three times on all buckets and flow rate meters (see attached sheet).
4. If the water does not reach the 1 gallon mark on the buckets in an average of 1.11, 5.00, and 25.00 minutes  $\pm$  10 seconds for each bucket, the valve on the flow rate meter will be adjusted with recalibration until desired flow rate. These secondary calibrations (if needed) will be recorded on the calibration recheck sheet.

Calibration

Date/ Time/ Initials:

Water Temperature:

		1 gallon per 1.11 minutes, 0.84 gallons per minute																			
		Bucket 1					Bucket 2					Bucket 3					Bucket 4				
Rep		1	2	3	Ave.	Diff.	1	2	3	Ave.	Diff.	1	2	3	Ave.	Diff.	1	2	3	Ave.	Diff.
Time (1.11 min)																					
		1 gallon per 5.00 minutes, 0.2 gallons per minute																			
		Bucket 1					Bucket 2					Bucket 3					Bucket 4				
Rep		1	2	3	Ave.	Diff.	1	2	3	Ave.	Diff.	1	2	3	Ave.	Diff.	1	2	3	Ave.	Diff.
Time (5.00 min)																					
		1 gallon per 25.00 minutes, 0.04 gallons per minute																			
		Bucket 1					Bucket 2					Bucket 3					Bucket 4				
Rep		1	2	3	Ave.	Diff.	1	2	3	Ave.	Diff.	1	2	3	Ave.	Diff.	1	2	3	Ave.	Diff.
Time (25.00 min)																					

Calibration Recheck

Date/ Time/ Initials:

Water Temperature:

Rep  
Time (1.11 min)

1 gallon per 1.11 minutes, 0.84 gallons per minute			
Bucket 1	Bucket 2	Bucket 3	Bucket 4
1	1	1	1

Rep  
Time (5.00 min)

1 gallon per 5.00 minutes, 0.2 gallons per minute			
Bucket 1	Bucket 2	Bucket 3	Bucket 4
1	1	1	1

Rep  
Time (25.00 min)

1 gallon per 25.00 minutes, 0.04 gallons per minute			
Bucket 1	Bucket 2	Bucket 3	Bucket 4
1	1	1	1

TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES

**Hobo Temperature System, My Spool Alarm System and Freezer Backup**

SOP Number: M.019.06

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

This Standard Operating Procedure is intended to assure that residue samples and test substance maintain their integrity from collection of the samples to the shipping of the samples and receiving the test substance to the end of the trial.

EQUIPMENT DESCRIPTION:

The Hobo U23 Pro v2 Data Logger uses an optical USB communications interface (via a compatible shuttle or base station) for launching and reading out the logger. The optical interface allows the logger to be offloaded without compromising the electronics. The USB compatibility allows for easy setup and fast downloads (SOP M.014.14). The optic USB base station is the device that communicates between the host computer and the datalogger.

Minimum/Maximum Thermometers will be used for secondary devices.

Frozen water inverted test tubes are used as backup to indicate samples are kept frozen.

PROCEDURES:

The designated personnel that will conduct the Residue Sample and Test Substance storage procedures will refer to the following outlined SOP and Equipment Manuals for the Hobo temperature system, Walk-in Cold Storage, and Kenmore Chest Freezers for operation, installation and maintenance.

HOBO TEMPERATURE SYSTEM AND FREEZER OVERVIEW:

1. Refer to the Hobo temperature system manual for proper installation and maintenance (SOP M.014.14).
2. The Hobo system will be activated before logging of product (SOP C.001.21) and will be used to record the daily temperatures for the duration of time product is held in freezers. The Hobo temperature system is programmed to record constant real time temperatures every 30 minutes for freezers and 1 hour for pesticide storage room. The temperature sensors will always be present in the freezers to constantly collect all real time temperature. The maximum and minimum temperature range will be recorded to represent the protocol requirements.
3. The readings will be downloaded to the Hobo software and saved to an excel file. The data will be saved as Treated Freezer 1, Backup Freezer 2, Untreated Freezer 3, and Walk-in Cold Storage 4 files.
4. A summary of all data pages will be dated and initialed and placed into the appropriate Field Data Book. An exact copy will be placed into the on-site Log Book.
5. There is a battery power gauge on the Hobo program which indicates how much battery life is left. The batteries that power the sensors will be replaced at approximately 50% full (+/- 5 %) to assure the test substance temperature data is securely documented.
6. Minimum/Maximum thermometers will be in the treated and untreated freezers to ensure temperature range integrity. The Minimum/Maximum thermometers will be re-set after they

are placed into the freezers and reach current temperatures. This will reflect their current temperature conditions.

7. The My Spool alarm system will be recalibrated yearly (+/- 30 days) by comparing outdoor temperatures with a standard alcohol indoor/outdoor thermometer. For calibration information, refer to SOP R.006.06. Calibration paperwork will be placed in the on-site Log Book and later archived.
8. In case of power outage at the study site (TNRC), a backup generator will automatically provide immediate short-term power for the freezers to continue running. This generator is checked annually for maintenance and data is logged (see attached sheet). Coolers and ice are also available for backup.
9. In case of mechanical failure for specific freezers or walk-in cold storage, the samples will be transferred to the backup freezers and all movement will be documented.
10. In case temperature system malfunction, a separate or back-up data logger will be on hand and started to ensure the temperature is recorded and the Study Director will be notified. All routine and non-routine maintenance will be documented; see SOP R.006.06 for log entry.
11. If the temperature does manage to fall out of range of the Protocol, the Study Director will be informed.
12. A freezer/Hobo temp. system activity log sheet will be used to record all maintenance activities done during the duration of the trial. (see attached sheet).





TREVOR NICHOLS RESEARCH CENTER

MICHIGAN STATE UNIVERSITY

STANDARD OPERATING PROCEDURES

Collecting Residue Samples

SOP Number: R.001.11

Revision Date: 4/20/2018

Effective Date: See approved by RFC date

PURPOSE:

To ensure that samples taken for residue analysis will represent the protocol requirements and the integrity of the samples will remain intact during the samples process.

EQUIPMENT DESCRIPTION:

Clean buckets or Ziploc bags large enough to accommodate the crop. Coolers will be used when necessary with blue ice packs. The equipment used will vary depending on the sample type. Disposable Nitrile gloves or something similar should be used. IR-4 sample bags or bags that are provided by individual sponsors should be used when appropriate.

PROCEDURES:

The designated personnel that will conduct the sample collecting will refer to the following outlined SOP to ensure the integrity of the samples.

COLLECTING RESIDUE SAMPLE PROCEDURES:

1. Specific samples requested, including growth stage, sample size, sample amount, and pre-harvest intervals are outlined in the protocols.
2. Samples will be typical of a commercially grown commodity.
3. Except when specified from individual protocols, samples will be taken from at least 3 individual plants, collected in a manner to ensure impartial sample that represents the entire plot (except from plot ends). Collect samples from high/ low, exposed/ sheltered, and inside/ outside of the plant canopy.
4. Clean Nitrile gloves will be worn during sampling and changed between sampling to prevent contamination. Sample the untreated plots first. Then sample the treated plot, starting with the lowest rate to the highest rate. Use the appropriate PPE when harvesting the fruit.
5. Samples will be harvested in clean buckets, Ziploc plastic bags, or plastic-lined IR-4 cloth bags. Place samples into their appropriate freezer as soon as possible. If samples cannot be placed into a freezer within approximately one hour, then the samples will be placed into coolers with blue ice packs to ensure the integrity of the sample. Avoid contamination from vehicles, clothing, or other samples.
6. All samples will be labeled according to individual protocols.
7. For 0 day sampling, allow the fruit and plant to dry before harvest.

TREVOR NICHOLS RESEARCH CENTER  
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STANDARD OPERATING PROCEDURES  
Packing and Shipping of Residue Samples

SOP Number: R.002.11  
Revision Date: 5/5/2023  
Effective Date: See approved by RFC date

PURPOSE:

To ensure frozen residue samples are removed from freezer storage and shipped to the appropriate analytical laboratory without loss of sample integrity.

EQUIPMENT DESCRIPTION:

Cardboard boxes large enough to accommodate sample size and weight.

Plastic Ziploc bags should be used when it is needed to ensure integrity of the samples.

Packing tape strong enough to secure boxes for transport.

Freezer truck (ACDS) Bill of Lading forms; Location of Bill of Lading forms is the IR-4 residue storage area and freezer storage room.

PROCEDURES:

The designated personnel that will conduct the packing and shipping of Residue Sample procedures will follow the outlined SOP and appropriate protocols.

PACKING AND SHIPPING PROCEDURES

1. Generally, frozen residue samples will be transported to the designated analytical lab by way of freezer truck (ACDS). It is the responsibility of the Field Research Director or staff to arrange the time and date the residue samples will be picked up by freezer truck company. If samples are to be shipped with dry ice, the Field Research Director or staff will follow the protocol for proper shipping requirements to insure the integrity of the samples.
2. Prior to freezer truck arrival, boxes should be constructed using packaging tape and outside of boxes properly labeled. The labels must have the following information: treated and untreated identification, sample ID, lab address, shipping numbers, and box numbers (ex. 1 of 2, 2 of 2) should be written on the outside of the box for delivery.
3. All chain of custody paperwork for ACDS should be filled out prior to arrival.
4. Samples will be packed according to individual trials. Untreated and treated samples will be packaged separately.
5. Upon arrival of freezer truck, remove frozen samples and place them into the properly labeled boxes.
6. Place exact copies of the Field Data Book shipping paperwork into the appropriate boxes and tape shut for transport.
7. Receive shipping invoice from driver and place into the appropriate FDB.
8. Once samples are given to the transporter (or earlier if required by the protocol), fill out the appropriate FDB paperwork and send the appropriate FDB shipping papers to the Study Director and Regional Field Coordinator. Also, inform the appropriate analytical lab to inform them the samples have been sent.

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STANDARD OPERATING PROCEDURES

Storage of Residue Samples

SOP Number: R.003.18

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

This Standard Operating Procedure is intended to ensure that residue samples maintain their integrity from collection of the samples to the shipping of the samples.

EQUIPMENT DESCRIPTION:

The Hobo U23 Pro v2 Data Logger uses an optical USB communications interface (via a compatible shuttle or base station) for launching and reading out the logger. The optical interface allows the logger to be offloaded without compromising the electronics. The USB compatibility allows for easy setup and fast downloads (SOP M.014.14). The optic USB base station is the device that communicates between the host computer and the datalogger.

Minimum/Maximum Thermometers will be used for secondary devices.

Frozen water inverted test tubes are used as backup to indicate samples are kept frozen.

PROCEDURES:

The designated personnel that will conduct the Residue Sample procedures will refer to the following outlined SOP and Equipment Manuals for the Hobo temperature system, Walk-in Cold Storage, and Kenmore Chest Freezers for operation, installation and maintenance.

STORAGE OF RESIDUE SAMPLES PROCEDURES:

1. The harvested samples should be transported, as soon as possible, from the field to the residue freezer area in clean containers.
2. Transport residue samples in non-contaminated vehicles.
3. Store or freeze samples in non-contaminated areas.
4. Untreated samples will be stored separately from treated samples.
5. Refer to the Hobo temperature system manual for proper installation and maintenance (SOP M.014.13).
6. The Hobo system will have been already activated (before logging of product, SOP C.001.21) and will be used to record the daily temperatures. The Hobo temperature system is programmed to record constant real time temperatures every 30 minutes for freezers. The temperature sensors will always be present in the freezers to constantly collect all real time temperature. The maximum and minimum temperature range will be recorded to represent the protocol requirements.
7. The readings will be downloaded to the Hobo software and saved to an excel file. The data will be saved as Treated Freezer 1, Backup Freezer 2, Untreated Freezer 3, and Walk-in Cold Storage 4 files. A printed summary and of all data pages will be dated and initialed and placed into the appropriate Field Data Book. An exact copy will be placed into the on-site Log Book.

8. There is a battery power gauge on the Hobo program which indicates how much battery life is left. The batteries will be replaced at approximately 50% full (+/- 5 %) to assure the test substance temperature data is securely documented.
9. The My Spool Alarm System and the Minimum/Maximum thermometers will be in the treated and untreated freezers to ensure temperature range integrity. The My Spool Alarm System will send a text and an email to notify personnel if temperatures fall out of range. The Minimum/Maximum thermometers will be re-set after they are placed into the freezers and reach current temperatures. This will reflect their current temperature conditions.
10. The Hobo temperature system will be recalibrated yearly (+/- 30 days) by comparing outdoor temperatures with a standard alcohol indoor/outdoor thermometer. For calibration information, refer to SOP R.006.06. Calibration paperwork will be placed in the on-site Log Book and later archived.
11. Freezers will be locked while samples are being held.
12. Samples will be logged in chronological order to ensure tracking of samples (see attached sheet).
13. In case of power outage to the TNRC, a generator will automatically power the facility to continue freezer operation. On-site personnel will give power outage notifications.
14. In case of electrical failure that might jeopardize the integrity of the samples, an alternate power source will be used for the freezers.
15. In case of mechanical failure, the samples will be transferred to the backup freezer and all movement will be documented.
16. In case temperature system malfunction, a separate or back-up data logger will be on hand and started to ensure the temperature is recorded and the Study Director will be notified. All routine and non-routine maintenance will be documented; see SOP R.006.06 for log entry.
17. A freezer/Hobo temp. system activity log sheet will be used to record all maintenance activities done during the duration of the trial (SOP M.019.06).





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STANDARD OPERATING PROCEDURES

Residue Test Plot Design

SOP Number: R.004.08

Revision Date: 4/20/2018

Effective Date: See approved by RFC date

PURPOSE:

To ensure that all of the protocol guidelines for a GLP test system design will be met.

EQUIPMENT DESCRIPTION:

Durable large markers/stakes: stakes should be large enough to write out all appropriate information and durable enough to persist for the duration of the trial.

Peel-off China Markers or other suitable permanent marker.

A tape measure long enough to measure the plot length.

A hammer to drive the stakes into the ground.

PROCEDURES:

The designated personnel that will conduct the test system design procedures will refer to the following outlined SOP and the protocol to ensure the integrity of the plot design.

TEST SYSTEM DESIGN PROCEDURES:

1. The test system site will be selected in the geographic area where the crop is commercially grown.
2. Each test system site will consist of: one untreated and one or more treated plots. The untreated control plot should be placed up-wind (based on prevailing winds) of the treated plot to reduce the risk of contamination from drift. Employ adequate buffer zones between each plot to prevent contamination from drift.
3. Each test system site will be adequate in size to ensure that no more than 50% of the sampled area will be needed to provide the necessary plant material. Select a test site that had been maintained following good agricultural practices for the production of the necessary plant material.
4. The test system design plot should be adequate in size to accommodate the application equipment to be used.
5. Using the markers/stakes and peel-off China markers (or similar permanent marker), write all the appropriate information needed, which includes the minimum of: Field ID, treatment, and the test material to be applied. Stakes will be placed at the plot row ends.
6. Starting at one plot row end, hammer in the stake and measure the proper distance using the tape measure and hammer in the second stake. The distance between both stakes should be the exact plot length. This distance will be used for actual pass times, which will determine the amount of product to be applied to the plot. (SOP M.013.10)

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STANDARD OPERATING PROCEDURES

Cherry Cooling System

SOP Number: R.005.09

Revision Date: 5/5/2023

Effective Date: See approved by RFC date

PURPOSE:

To demonstrate residue levels directly from field harvest in comparison with fruit that undergoes a simulation of the cold water wash typical for processed tart cherries.

EQUIPMENT DESCRIPTION:

The 5 gallon bucket cherry cooling system. The system includes rubber hoses, water flow rate meter with hose connection, and mesh for the tops of the buckets.

Thermometer

Stopwatch

PROCEDURES:

The designated personnel that will conduct the sample rinsing will refer to the following outlined SOP to ensure the integrity of the samples.

CHERRY COOLING SYSTEM PROCEDURES:

1. Prior to sample collection the water temperature is taken to assure that water temperature is 60 degrees Fahrenheit or less.
2. After sample collection, cherry samples are held in plastic bags until they are dumped into 5-gallon cooling buckets, one bucket for each sample. Each bucket has a hose inlet near the bottom, such that when well is running the water will overflow the top of the buckets. Flow rate calibrations are done prior to sampling (SOP M.018.08).
3. After the cherries are dumped into the buckets, the mesh tops are tied to the tops of the buckets so the cherries stay inside while the water is running out.
4. Set the flow rate valve to deliver water at gallons per minutes designated in the protocol.
5. Get the stopwatch ready and turn the water on for the duration of time requested in the protocol.
6. These buckets are designated for treated/ untreated samples. Samples not of the same trial are cooled in separate buckets. All buckets are run simultaneously, then triple rinsed before being used for a second set of samples. Buckets designated for untreated samples are never used for treated samples. All buckets are triple rinsed after use.
7. After cooling, all the cherries are processed by pitting with hand-pitters, placed in plastic bags, and frozen.

Trial ID:                                      Sample #:                                      Date:                                      Time after wash:                                      Initials:

- 1. Select the optimum flow rate settings to obtain the target GPM on the buckets being used.
- 2. Record the flow rate and the time taken to wash the samples.

Sample ID, Bucket #	1	2	3	4
Flow Rate (GPM)				
Time Elapsed				

Water Temperature:

Signature: \_\_\_\_\_

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STANDARD OPERATING PROCEDURES

Check and Calibration of the Hobo Temperature System

SOP Number: R.006.06

Revision Date: 5/7/2020

Effective Date: See approved by RFC date

PURPOSE:

To ensure that the Hobo temperature alarm system will be recording accurate temperature data throughout the season for all sample freezers and pesticide storage areas.

EQUIPMENT DESCRIPTION:

A standard ACU-RITE indoor/ outdoor red dyed alcohol temperature gauge and the Hobo Temperature System.

PROCEDURES:

The Hobo temperature system will also be checked on a weekly basis starting from activation ( $\pm 1$  day) to make sure the computer system is recording correctly and the battery power is sufficient in the receiver and nodes. If the computer is not recording temperatures the system will be reset and calibrated.

The designated personnel will conduct a yearly comparison of the outdoor temperature with the ACU-RITE temperature gauge and the Hobo temperature system. Both temperature gauges and/ or sensors will be kept out of direct sunlight for 20 minutes. Then temperature readings will be recorded for both systems every 15 minutes for one hour. The temperatures will be compared and the 4 temperatures will be averaged. If the difference in the average temperatures for the 2 systems are  $\pm 5.0$  degrees Fahrenheit, the Hobo temperature sensors will be tested a second time in an alternate location. If temperatures are still  $\pm 5.0$  degrees Fahrenheit the sensors will be replaced with new sensors and tested a third time. If temperatures are still not comparable between the two systems, the computer will be checked for updates and/ or replaced with a backup computer.

CHECK PROCEDURES:

1. Check the temperature recordings to make sure that the data nodes are active and receiver is connected. Make sure the system is consistently collecting data every 30 minutes for freezers and 1 hour for pesticide mixing room.
2. If everything looks good nothing check the good box. If the computer is not reading the sensor correctly, then check the bad box and evaluate the sensor.

CALIBRATION PROCEDURES:

1. Take the ACU-RITE temperature gauge from the TNRC archiving office and bring it outside to the IR-4 freezer room door.
2. Hang the ACU-RITE gauge on the designated hook outside the door under the window, which is in the shade.
3. Leave the ACU-RITE gauge hang for 20 minutes to get acclimated to the temperature.
4. Take the Hobo temperature sensors out of their designated freezers and put them outside next to the standard outdoor gauge.



5. Check the computer to make sure it is running properly and record (see attached sheet).
6. After 20 minutes of the ACU-RITE outdoor temperature acclimation, compare temperatures of the two systems. First check the computer for the current hobo temperature by recording the temperature and the time that it occurred on the attached sheet. Within three minutes check the ACU-RITE gauge.
7. Check the ACU-RITE gauge temperature and record the temperature and the time in which it occurred on the attached sheet.
8. After 15 minutes record the temperature and time at which it occurred for both systems.
9. Repeat step 8 three more times until 4 temperature and time recordings are taken.
10. Take the mean of the four temperatures for both systems and compare those means. If those two numbers are greater than 3.0, then changes will be made according to the procedures.





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STANDARD OPERATING PROCEDURES

Safety and Safety Inspection

SOP Number: X.001.06

Revision Date: 4/20/2018

Effective Date: See approved by RFC date

PURPOSE:

To ensure the health and safety of the Trevor Nichols Research Center Personnel.

SCOPE:

Management will provide and maintain safe and healthy working conditions and will promote safe work practices to protect the health of the employees.

Trevor Nichols Research Center is an off-campus research facility under the direction of Michigan State University. Safety inspections are a part of Michigan State University's responsibility.

- a. Safety inspections are conducted yearly by Michigan State University through the office of the Department of Public Safety.
- b. The inspections include, but are not limited to, the monitoring of the working environment of the employees, controlling and eliminating safety, health, fire, and other hazards, and preserving/ improving environmental factors, which contribute to improved health and safety protection.
- c. After the inspection, the Department of Public and Safety responds to the farm manager of Trevor Nichols Research Center and reports any violations that may have been found.
- d. A written response to the Department of Public Safety will be given with a plan of action to take care of any violations that were cited.

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STANDARD OPERATING PROCEDURES

**Treated Crop Destruct**

SOP Number: X.002.05

Revision Date: 4/20/2018

Effective Date: See approved by RFC date

PURPOSE:

To ensure the leftover treated crop has been destroyed or handled in such a way that it cannot be consumed as a human food or animal feed.

PROCEDURES:

1. Field residue trials are conducted on private University property, with a full time employee living on the station to assure against unauthorized human contact.
2. After all treated and untreated samples have been harvested, the remaining crop load will be left on the plant to drop to the ground and decompose by natural means.
3. All treated and untreated crop will remain on the Trevor Nichols Research Center. No fruit from the station will enter the commercial food market.