Minor Use Foundation

STANDARD OPERATING PROCEDURES FOR GLP RESEARCH PROJECTS

Revision 1 | October 5, 2026



Standard Operating Procedures (SOPs) for Field Research

Standard Operating Procedures are documents that describe practices, procedures, and activities regularly used in the conduct of pesticide residue field trials, and address topics related to the development, monitoring, and reporting of data collected and generated during a research study. The Field Research Investigator for residue field trials is responsible for adhering to these SOPs which can also be used for training new field personnel.

The following is a set of SOPs for field personnel developed by the Minor Use Foundation that will help ensure that all necessary and appropriate data related to the trial is properly collected and recorded, and that field trials are performed according to Good Laboratory Practices (GLPs) guidelines developed by the Organization for Economic Cooperation and Development (OECD). Pesticide residue studies that generate data for the establishment of an international Codex MRL (Maximum Residue Level) for a specific pesticide/crop combination must be conducted in accordance with GLPs; having and following a set of SOPs is one of the items included in the GLP guidelines.

The MUF developed these SOPs to highlight and help researchers understand the procedures and activities that are important to consider in a GLP residue field trial, thus ensuring the quality and validity of the field data. Monitoring and recording temperature of the test substance (pesticide) during storage and transport; entering data at time of occurrence; calibrating equipment, instruments, and devices used in the trial; etc., are examples of standard procedures associated with GLP residue field trials. The Field Research Investigator at a research site may already have his or her own set of SOPs but it is important that those SOPs address the topics and specific items found in MUF's SOPs. A researcher may want to fully adopt MUF's SOPs but add an appendix/addendum to each, if appropriate, that describes an activity or procedure specific to their site. The SOP Index/Table of Contents can be customized for each field site and used to locate or reference a specific SOP, as needed.

These SOPs are intended to be a reference for researchers and professionally trained technicians when conducting residue field trials or when teaching others about applying pesticides and conducting field research.

Revision 1 | October 5, 2026

Minor Use Foundation

Standard Operating Procedures – Field

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Organization:

Address:

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SOP: 1.1 R1

EFFECTIVE DATE: September 10, 2024

AUTHOR(S): Wilfredo Robles, Edwin Barbosa, and Bill Barney

APPROVED BY: see cover page

TITLE: **General requirements for the development and use of Standard Operating Procedures (SOPs)**

PURPOSE: To provide guidelines for the development of Standard Operating Procedures

SCOPE: This applies to SOPs used in Minor Uses Foundation Pesticide Residue Studies.

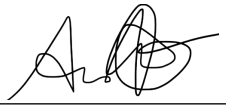
PROCEDURES:

1. Each facility where trial(s) are conducted in support of the registration of pesticides may develop SOP's for all phases of the research.
2. Generic SOP's from the MUF are provided to each facility; these SOPs can have additions to accurately reflect that facility's policies, procedures, and methods. Where generic SOP's are not available, the Field Research Investigator may develop appropriate SOP's and have them approved by MUF staff before their use in GLP studies.
3. Any newly developed SOP will be shared with the MUF Regional Coordinator and approved by the MUF Executive Director or her designee. The SOP title page should include MUF's approval signature, approval date, and effective date.
4. All Standard Operating Procedures (SOPs) should be reviewed every two years and revised by the Field Research Investigator before the initiation of studies for that year to determine if revisions are needed. The index page includes the date that an individual SOP was developed and, if revised, the date and revision number of that SOP. Correcting spelling or formatting errors, along with minor changes that clarify the SOP's intended meaning, does not constitute a revision. If an SOP is no longer needed or used, the SOP will be listed on the index page under a heading labeled "Retired" and include the year it is retired; it can be removed from the index in subsequent years.

5. The first number of an SOP indicates the general category (e.g. “5” relates to Samples and Sampling); the second number (e.g., “1”) indicates the SOP number within that category (e.g. “5.1” is Handling, Preparation, and Packaging of Samples). If/when an SOP is added, it is placed in the appropriate category, and the numbering is sequential within the category.

6. These SOPs are designed to be general guidelines for procedures and instructions to follow if a procedure has become a standard set of actions utilized in a GLP residue field trial. SOPs are not intended to describe every possible action that may be necessary for the complex and extremely variable operation of field trials and associated facilities. They are not intended to be all-inclusive. Actions that are not standard but specific to individual situations should be explained and documented in the Field Data Notebook.

Approved by:



October 5, 2026

Anna Gore, Executive Director
Minor Use Foundation

Date

SOP: 2.1 R1

EFFECTIVE DATE: September 10, 2024

AUTHOR(S): Wilfredo Robles, Edwin Barbosa, and Bill Barney

APPROVED BY: see cover page

TITLE: **Recording Data in the Field Data Notebook (FDN)**

PURPOSE: Provide guidelines to ensure the data collected and recorded in the FDN is accurate, well-documented, verifiable, and available for review.

SCOPE: Applies to all field trials in Minor Use Foundation's magnitude of pesticide residue studies.

PROCEDURES:

1. It is the responsibility of the Field Research Investigator to ensure that all data and other items connected with the study are stored in a clean and safe/secure place and are accessible by authorized study personnel.

2. All raw data entered in the FDN will be recorded in indelible ink. Blue ink is preferred as it distinguishes the original from future copies. The use of pencils or correction fluid (white-out) is strictly prohibited.

3. If forms are generated to replace or supplement the forms in the Field Data Notebook (e.g. freezer logs, chemical storage log), the forms must contain all information on the original form and, once completed, be included in the FDN.

4. Corrections will be made by crossing through the item with a single line, initialing, and dating. A reason for the change or error code must accompany any change.

5. Acceptable error codes include:

ME = Measurement Error	CE = Calculation Error
SP = Spelling Error	EE = Entry Error
WE = Wrong Entry	LE = Late Entry
IE = Illegible Entry	IW = Inappropriate Word
TE = Transcription Error	AW = Accidental Write-over

UE = Unnecessary Entry PE = Pagination Error

NA = Not applicable NI = New Information

6. Blank spaces in the field data notebook should be lined out; if there is no reason given for the line-out, it means the space was not needed.

7. Initial and date each activity as it occurs, not later or at a more convenient time.

8. Electronic data, computerized summaries, etc., are permissible.

9. All notebooks, data sheets, summaries, etc., should be clearly marked with the name of the project, field ID number, date, and initials of the person responsible for the data, and any other information that may be needed to understand the data and its source.

10. Make sure that all data required in the study protocol or by the forms provided in the field data notebook are collected and recorded. Carefully review the protocol to ensure that all required data is being collected.

11. Transcribed data in the field data notebook must indicate the location of the original and be verified by someone other than the transcriber.

12. Pagination in the FDN is not considered raw data and does not require a date and initials. Copies of original documents/data that are included in the notebook will be indicated as such with a stamp or written statement that reads: “This is a true copy of the original”. The location of the original should be indicated.

Approved by:



October 5, 2026

Anna Gore, Executive Director
Minor Use Foundation

Date

SOP: 3.1 R1

EFFECTIVE DATE: August 14, 2024

AUTHOR(S): Wilfredo Robles, Edwin Barbosa and Bill Barney

TITLE: **Plot Selection**

PURPOSE: To establish the necessary parameters for selecting the plot that can ensure the generation of reproducible data and samples with sufficient uniformity.

SCOPE: All locations conducting field trial(s) for Minor Use Foundation to determine the magnitude of pesticide residues

PROCEDURES: The criteria for defining the experimental plot are listed below, which follow the instructions indicated in FAO Manual 225, p. 51.[1]

1. Site selection will be made in accordance with the horticultural practices acceptable for the commodity and the requirements established by the protocol.
2. The site will be large enough to accommodate the required number of replicates, buffer zones, and treatments in accordance with an approved study protocol and for the commodity to be grown under simulated commercial conditions, yielding samples of sufficient size to comply with protocol sample size requirements.
3. Use a commercial crop variety that must be found in adequate phytosanitary conditions. The type of soil at the test site must be clearly described and indicated in the field data notebook. If the application is made directly to the soil, the study should include tests with different soil types or as directed by the protocol.
4. The location of plots within the commercial plantation should be at one end of the commercial area, to maintain isolation and avoid the effect of commercial work or applications, or other research studies that may influence the test results.

[1] Manual on the Submission and Evaluation of Pesticide Residues Data _ Third Edition (2016)

5. Locate nontreated plots within the same area [preferably upwind and upslope of the treated plot(s)] but with enough isolation to produce nontreated, noncontaminated samples.
6. There must be a distance of at least 30.5 meters (or the distance indicated by the protocol) between the treated plot and the untreated plot (absolute control) to avoid contamination by product drift. The untreated plot must be located so that the wind does not drag material from the treated plot.
7. A map should be made to define the location of the trial relative to the nearest city or town, and another map with the location of the trial on the farm or plantation. A separate map of the plots must indicate the location of the treated and untreated plots relative to each other, including the buffer zone, distance to the plots from at least two permanent reference points, and distances and relative locations of any other experimental plots that may be located on the farm or plantation.
8. The plot corners will be clearly defined with visible markers such as stakes or flags. Label each plot with the field identification number, treatment number, treatment name, test substance name, and crop, and/or as required by the study protocol. On each visit, check to see that the markers are in good condition.
9. Soil analysis should be conducted to describe the test plot. Analysis should include pH and % organic matter, and physical properties (i.e., sand, silt, and clay composition). It should also include the climatological information of the area, and the cultural activities and maintenance pesticide applications of the test site during the trial period, and for at least one year and preferably for the last 3 years. All this information must be properly recorded.
10. Post signs stating that the crop is for experimental purposes and that the food commodity is not suitable for human or animal consumption. Destruction of the treated crop, including the date performed, should be documented in the field data notebook.

Approved by:

October 5, 2026

Anna Gore, Executive Director
Minor Use Foundation

Date

SOP: 4.1 R1

EFFECTIVE DATE: September 10, 2024

AUTHOR(S): Wilfredo Robles, Edwin Barbosa, and Bill Barney

APPROVED BY: see cover page

TITLE: **Labeling, Storage, Transport, and Measurement of the Test Substance**

PURPOSE: Provide guidelines to ensure the test substance is stored properly and integrity is maintained during transport; ensure the amount of test substance used in the study is accurate and verified; and ensure that pesticide concentrate, spray solutions, rinse water, and containers are disposed of with minimal environmental contamination and in accordance with local regulations.

SCOPE: Applies to all field trials in Minor Use Foundation's magnitude of pesticide residue studies.

PROCEDURES:

I. Labeling and Storage

a. Upon receipt of the test substance, observe the physical condition of the containers and inspect for container wear, breakage, tampering with tamper-evident seals, unreadable or damaged labels.
b. Confirm that it has been characterized under GLP, that an expiration date is indicated on the container or in the Certificate of Analysis (COA), and that the test substance received matches what is indicated in the study protocol. Verify that the information on the label of the container matches that on the COA and in the protocol. Contact the Study Director if there are any discrepancies.
c. Record the amount received, name of the person who received it, and other information related to the test substance that is located on the label or in associated paperwork received. This information is to be recorded in Part 4 of the Field Data Notebook. The container label should include the code or lot/batch number provided by the manufacturer, expiration date, formulation, quantity, and be marked as being GLP characterized.
d. Store the test substance under conditions that prevent cross-contamination with other pesticides, loss of homogeneity, or stability. The test substance storage area is usually in a secure, clean, dry space. Document storage temperature with a temperature recording device during the life of the study.

e. The original containers for all GLP test substances and adjuvants must be retained until completion of the study, and permission is given by the study director, regional coordinator, or other pertinent source to dispose of the containers.
f. Temperature monitoring should begin as soon as possible upon receipt of the test substance (or at least within two days), regardless of where it is held or stored. Be sure the storage area does not get too hot or too cold; review the storage conditions recommended by the manufacturer/registrant.
g. The storage facility should have limited access by the utilization of a lock and key so that only authorized persons may have access to GLP test substances.
h. Place a highly visible, waterproof identification sign on the door of the storage facility to advise of the hazardous nature of the storage facility's contents.
i. Post the telephone numbers and names of personnel responsible for and knowledgeable of the contents of the storage facility.
j. Make accessible materials such as (but not limited to, nor necessarily all) adsorptive clay, granulated activated charcoal, hydrated lime, and sodium hypochlorite for emergency treatment or detoxification of spills or leaks.
k. Post a current inventory of all test substances in the storage unit in an inside location accessible and visible to study personnel.
l. Adjuvants used in GLP trials should be stored in conjunction with the GLP test substances.
m. The storage area for the test substance and adjuvants should be separate from but may be adjacent to non-GLP pesticides to preclude contamination or mix-up.
n. If an adjuvant does not have an expiration date, use the purchase date as the initial date and add it to the container. It should be replaced 3 years after its purchase date.

II. Transport

a. If application of the test substance is to be made some distance from the test substance storage area, the original container can be transported to the field, accompanied by the product safety data sheet and separated from the application equipment. It is also acceptable to pre-measure the required amount needed for the application, which can be placed in an appropriate container and labeled properly with the trial number, chemical name, trade name, batch/lot number, expiration date, treatment number, and amount (weight or volume). It is advisable to also transport a second pre-measured amount of test substance as a backup, in the event the first pre-measured amount is accidentally spilled.
b. During transport, ensure the integrity of the test substance by including blue or wet ice in the transport container (e.g., a cooler) and document the temperature during transport with a temperature recording device placed in the transport container. Document transport temperature and procedures used during transport in the field data notebook. Similarly, when a test substance is used, the date, amount used, purpose of use, and initial/signature of the user should be recorded in the pesticide storage log.

III. Measuring the Test Substance

Before measuring a liquid formulation of the test substance, it must be shaken thoroughly to ensure homogeneity. When opening the lid, it is necessary to wait about 5 seconds to permit chemical vapor to be released to the air. Use appropriate personal protective equipment while handling the test substance.

Liquid Formulations:
Obtain a clean container large enough to hold the volume of test substance needed and graduated in increments small enough to ensure accurate measurement. For example, if the amount needed is less than 10 ml, use a pipette, graduated cylinder, or syringe with 0.1 ml increments. If the amount needed is 10 to 25 ml, increments should be 0.2 ml; if 25-100 ml, increments should be 1.0 ml; if 100-250 ml, increments should be 2.0 ml. If greater than 250 ml, a cylinder with 5 ml increments is adequate. Carrier (e.g., water) is usually needed in amounts greater than 1,000 ml, and using a cylinder with 5- or 10-ml increments is adequate. Reading of the liquid test substance or water should be made at the bottom of the meniscus.

1. If the opening of the cylinder is too restricted to allow pouring of the test substance from the original container into a graduated cylinder without danger of spillage, do one of the following:
    a. Use a clean glass container with a pour lip as an intermediate and fill the cylinder from it.
    b. Use a clean funnel large enough to allow filling the cylinder with a minimum of spillage.
    c. Use a pipette with appropriate gradations and a squeeze bulb to extract the test substance directly from the test substance container and inject it into the spray tank.
    d. Use a syringe with appropriate graduations to extract the test substance from the container and inject it into the spray tank.

2. Add some pre-measured water to the spray tank. Pour the liquid test substance directly into the spray tank. If a graduated cylinder is used to measure or transfer the test substance, triple-rinse the cylinder with some pre-measured water; add this rinsate to the spray tank.

3. The amount of test substance and water needed for the application is determined by knowing the rate of the formulated test substance per hectare and plot size. Once dosage and water for the individual plot are determined, allow for and calculate overage (e.g. ≥25% of the required amount) for the test substance and water, to ensure there is enough test substance solution to prime the boom and to reduce the risk of running out of solution before exiting the plot.

4. If the use of an adjuvant is required by the protocol, ensure that the order of adding each component to the spray mixture is the following order: 1- Water, 2- Test Substance, 3- Adjuvant, and 4- Water.

Dry Formulations:

1. Select a clean container suitable to hold the desired amount of pesticide and tare it on the scale. Do not lean on or bump the weighing table when using scales.

2. The scale should be verified immediately before weighing the quantity of test substance for use in the study. A set of certified, stainless-steel weights can be used for scale verification. Verification can be accomplished as follows: Place on the scale the container into/onto which the test substance will be weighed and tare the scale. Then, bracket the weight, as appropriate (e.g., if 7 grams of test substance is required, verify with certified weights of 5 grams and 10 grams), and record the verification. Do not use the scale if the scale reading varies more than 1% from the certified weight. If the variance is greater than 1%, then use a backup scale that has been properly calibrated.

3. Add the test substance into/onto the tared container and record the weight. When transferring the test substance from the weighing container to the spray tank, be sure to remove all the test substance. (If necessary, rinse the container with some of the pre-measured carrier and add the rinsate to the spray tank.) The test substance can be added directly to the spray tank, as follows: add some pre-measured water to the tank, add the test substance, and stir, swirl, or shake to dissolve the material, then add the remaining pre-measured water. Swirl, stir, or shake again to make sure the solution is well mixed.

4. Alternatively, with some difficult-to-dissolve dry formulations, it may be desirable to create a slurry before adding the test substance to the spray tank. If so, with the use of a stirring rod, mix the measured amount of test substance into a slurry with some pre-measured water. Add some pre-measured water to the spray tank and then pour the slurry into the spray tank. Rinse the slurry container at least three times with additional pre-measured water and pour each rinsate into the spray tank. Add the remainder of the pre-measured water to the spray tank and attach the cap or lid. Agitate or shake carefully to mix the contents.

5. The amount of test substance and water needed for the application is determined by knowing the rate of the formulated test substance per hectare and plot size. Once the dosage and water for the individual plot are determined, allow for and calculate overage for the test substance and water, to ensure there is enough test substance solution to prime the sprayer and to reduce the risk of running out of solution before exiting the plot.

6. Use appropriate safety equipment while handling pesticide concentrate and spray

solution.

Granular Formulations:

1. Follow the protocol for the method of measuring and applying a granular formulation to the plot without dilution. Generally, the method will be to weigh as for a dry formulation, but instead of mixing with water, pour the test substance directly into the application equipment or spreader. Determine that the spreader is in good working order and good mechanical condition. Make sure that the openings to release the granular material are not clogged and free of debris. Refer to the manual for the calibration method.

IV. Disposal of Test Substance

1. Where institutional policies and guidelines do not exist, the following procedures should be followed.

2. Disposal of pesticide concentrate and/or containers.

    a. Follow procedures in the protocol. Generally, containers cannot be disposed of under GLP until the study is completed. If it is necessary to dispose of the container before the end of the trial(s), the Study Director should be consulted.

    b. Where possible, the pesticide concentrates and containers should be returned to the registrant or manufacturer. Transportation must be in accordance with local laws and regulations. Consult the Study Director for guidance.

    c. Follow label directions for use or disposal of the pesticide if option 2.b is not available.

    d. If no label directions exist for disposal, arrangements should be made with a licensed waste disposal firm for pickup and disposal of the pesticide and/or the empty containers.

3. Disposal of pesticide rinse water, unused spray solutions, and other dilute pesticide waste after a test application.

    a. Check local laws and regulations to determine any procedures that may exist for the proper disposal of pesticide solutions.

    b. Dispose of the dilute pesticide waste in the field by adding carrier (e.g., water) to the spray tank and spraying on an overplanting of the crop or an open field of

grass/weeds. All pesticide solutions should be mixed with the intent of limiting the problem of excess solutions.

c. Triple rinse the spray tank/container (i.e., add carrier to the tank and spray out).

Approved by:



October 5, 2026

Anna Gore, Executive Director
Minor Use Foundation

Date

SOP: 5.1 Rev. 1

EFFECTIVE DATE: August 14, 2024

AUTHOR(S): Wilfredo Robles, Edwin Barbosa, and Bill Barney

APPROVED BY: see cover page

TITLE: **Sample Collection**

PURPOSE: Provide guidelines to ensure that samples from supervised field trials are collected labeled and transported to maintain its integrity in accordance with Good Laboratory Practices and the protocol.

SCOPE: This procedure applies to all test substance applications from supervised field trials of the Minor Uses Foundation Pesticide Magnitude of Residue Studies.

PROCEDURES:

1. Choose an appropriate sampling method (representative, random, systematic, stratified random, etc.) and consider the factors that affect the distribution in the plot.
2. Select samples that represent the commercial practices of the harvest. Both untreated and treated samples must be comparable (same maturity stage, type, etc.).
3. Collect samples from the field, as indicated in the protocol (no sub-samples). Quartering or downsizing to reduce sample size or weight, if allowed by the protocol, should not be performed in the field but in a laboratory or clean room close to the storage freezers. Identify and label each sample with the trial number, treatment number, sample ID, and date.
4. Avoid contamination of the field samples during the sampling, labelling, storage, transport, and shipping processes (e.g., keep treated and untreated samples in separate containers at all times).
5. Do not collect samples from the edges or plot ends, or from the first and last plant in a plot row. Avoid sampling from one meter at the edges of the plots and the ends of the rows.
6. Disposable gloves will be used for all harvesting/sampling processes. Sampling tools should be cleaned before use and between samplings.

7. Avoid deterioration of surface pesticide residues during sample handling or packaging (e.g., do not brush or wash samples unless allowed in the protocol).
8. Samples should be representative of a mature, healthy crop; do not collect sick or diseased fruit or plant parts. If soil adheres to the sample, and if protocol allows a soft brush may be used to remove the soil.
9. Do not handle or store sampling equipment with the test substance or other agrochemicals.
10. The untreated plot must be sampled before the treated plot(s) to avoid contamination. If there is more than one treated plot, the sampling of the treated plots will progress in order from the lowest to the highest rate. After sample collection, the samples will be weighed on a scale to ensure the minimum protocol sample weight requirement has been met.
11. Select samples from the plant according to protocol requirements. Do not select samples that cannot be sold or are considered unmarketable. Avoid unnecessary exposure to light and heat.
12. If the final sample is whole, unaltered fruit, samples can be harvested and placed directly in MUF plastic-lined cloth bags that are properly labeled, as per the protocol. If the whole fruit will be altered to create the final sample (e.g., cut to reduce weight, separated into peel and flesh, etc.), then place fruit samples in clean plastic bags or other suitable container, label with test substance name, trial number, treatment number, and sample ID, and transport to the lab or clean room where they can be altered/prepared and frozen. The bags or containers should be made of a material that will not interfere with the analysis (check with the lab or Study Director).
13. Transport samples from the field to where they will be prepared or frozen in clean bags or other suitable containers, properly labeled and in a cooler with blue ice and a temperature recording device. Use separate coolers for treated and untreated samples. Record transport temperature and all procedures in the field data notebook.
14. For detailed sample procedures, see Appendix V, Manual FAO 225[1]. "Presentation and evaluation of pesticide residue data for the estimation of the maximum limits of pesticide residues in food and feed."

Approved by:

[1] Manual on the Submission and Evaluation of Pesticide Residues Data _ Third Edition (2016).



October 5, 2026

Anna Gore, Executive Director
Minor Use Foundation

Date

SOP: 5.2 Rev. 1

EFFECTIVE DATE: August 14, 2024

AUTHOR(S): Wilfredo Robles, Edwin Barbosa, and Bill Barney

APPROVED BY: see cover page

TITLE: **Handling, preparation, and packaging of samples**

PURPOSE: Provide guidelines to ensure that samples from supervised magnitude of residue field trials are handled, prepared, transported, and packaged in accordance with good laboratory practices and protocol.

SCOPE: This procedure applies to all test substance applications from supervised field trials of the Minor Uses Foundation Pesticide Magnitude of Residue Studies.

PROCEDURES:

1. Identify each sample and label, in dark indelible ink, with the following information: Name of the test substance, study number, trial number, treatment number, sample ID, and name and cellphone number of the Field Research Director.
2. Once samples are harvested in the field, if subsampling is needed (e.g., cut the fruit to reduce weight), do it in a clean field laboratory/room or in the analytical laboratory in proximity to the storage freezers. Consult the protocol or contact the Study Director to ensure subsampling is permissible. Separation of peel and flesh and/or other preparations for certain studies may be required to produce the final sample; like subsampling, these preparations must also be performed in a clean field laboratory/room or in the analytical laboratory in proximity to the storage freezers. Avoid heat and direct sunlight as soon as possible to minimize degradation of the test substance.
3. Use different containers to store or transport each sample from each treatment (i.e., one container for untreated control samples and another for treated samples). When transporting samples from the field to the lab or clean room, place the samples in a cooler with blue ice and an appropriate temperature recording device. Record transport temperature and all procedures in the field data notebook.

4. The elapsed time and temperatures from sampling to freezing of the sample must be recorded in the field data notebook and must be within the specifications of the protocol.
5. Once samples are properly labeled and frozen, store under conditions outlined in the protocol.
6. If samples are shipped to an analytical laboratory, follow the shipping instructions listed in the protocol or contact the Study Director for instructions. Include the appropriate ice for shipment (blue ice or dry ice, depending on delivery requirements). Confirm with the Study Director before dispatch. Obtain insulated containers, if necessary, of sufficient size and quantity to hold the residue samples and, if necessary, dry ice in a 1:2 to 1:5 weight ratio (sample: dry ice) to commodity. Pack the samples and dry ice in the containers just before shipment. The containers should have sufficient bursting strength to withstand normal handling of shipping and storage.
7. Notify the laboratory personnel when samples are scheduled to be shipped and when they can expect delivery to ensure the lab is prepared to receive the samples. Provide full details.
8. Record all actions performed in the field data notebook.

Approved by:



October 5, 2026

Anna Gore, Executive Director
Minor Use Foundation

Date

SOP: 6.1 Rev. 1

EFFECTIVE DATE: August 14, 2024

AUTHOR(S): Wilfredo Robles, Edwin Barbosa, and Bill Barney

APPROVED BY: see cover page

TITLE: **Maintenance and Use of Application Equipment**

PURPOSE: Ensure that the application equipment and other field equipment, as indicated by Good Laboratory Practices, are properly operated and maintained.

SCOPE: This procedure applies to all test substance applications from supervised field trials of the Minor Uses Foundation Pesticide Magnitude of Residue Studies.

PROCEDURES:

1. Visually inspect the condition and cleanliness of each piece of equipment before its use. Check that the application equipment, such as pressure gauges, nozzles, filters, and hoses is in good condition. Test for leaks and correct or replace equipment if necessary.

2. Identify each piece of equipment and keep track of its maintenance and usage.

3. Use the proper equipment and have a similar piece of equipment available as a backup. Bring both to the field every time you perform an application.

4. Bring a field toolbox containing replacement parts like gaskets in case repairment for leaks is needed.

5. Use each piece of equipment and perform proper maintenance according to the manufacturer's recommendations.

6. Keep and document accurate maintenance records. Maintenance required because of normal wear is defined as routine maintenance. Maintenance required as a result of equipment malfunction, not normal wear, defines non-routine maintenance. In the event of non-routine maintenance or repair, a record will be kept to describe the nature of the defect, how and when it was discovered, and remedial action taken, if any.

7. After each application, clean the equipment at least three times by performing a rinse with water, followed by a soap and water rinse, followed by a final water rinse as recommended or according to the manufacturer's recommendations. Be sure to include the pumping system, boom, and hoses. Dispose of wastewater according to current regulations.

8. Exceptions to the cleaning requirements may include equipment used in applying chemicals that may require specific solvents to remove chemical residues. In this case, cleaning methods must be thoroughly documented in the field data notebook or equipment log. Includea record of dates of equipment inspection, calibration, maintenance, and cleaning. Historical records will be retained in the archives.

9. If the equipment is not in use, store it in a safe and secure location away from the TS cabinet. Ensure that the equipment is secured to prevent unauthorized access and potential human exposure.

Approved by:



October 5, 2026

Anna Gore, Executive Director
Minor Use Foundation

Date

SOP: 6.2 Rev. 1

EFFECTIVE DATE: August 14, 2024

AUTHOR(S): Wilfredo Robles, Edwin Barbosa, and Bill Barney

APPROVED BY: see cover page

TITLE: **Calibration of Application Equipment**

PURPOSE: To ensure that equipment utilized for the generation, measurement, or assessment of GLP data is properly operated and maintained.

SCOPE: This procedure applies to all test substance applications from supervised field trials of the Minor Uses Foundation Pesticide Magnitude of Residue Studies.

PROCEDURES:

1. The discharge and speed calibration of the application equipment must be performed before commencing the first application.
2. Before calibration, the spray equipment will be inspected for visual damage or potential problems. The sprayer will be operated to observe the spray pattern and ensure that the pressure regulator is operating properly.
3. Before operating the sprayer, ensure the regulator valve is set at the low-pressure position. The regulator valve can then be adjusted to the desired pressure.
4. Sprayer pressure, time, RPM (if applicable), and any other sprayer settings should be recorded in the field data notebook. The parameters used during the actual application will be recorded and should remain unchanged from those used during the calibration.



Figure 1. Discharge calibration for a boom sprayer

5. For the initial 3-run calibration, put an adequate amount of clean water in the tank and charge the system by spraying out enough water to fill the hoses. For a boom sprayer, set up collection buckets, cups, or other receptacles and collect the discharge from each nozzle for at least 30 seconds (Figure 1). For a mist-blower, determine the sprayer output by displacement by marking the initial volume with a line on the sprayer and engaging the sprayer for 30-60 seconds or longer. Determine how much volume was displaced during the spray time by adding water back to the starting volume mark on the sprayer. Repeat two more times. For either boom sprayer or mist blower, record the total volume output and time for each run. The average output of the three runs will be the discharge rate calibration (ml/sec) for the application in the trial.
6. The time necessary to apply the required amount of spray solution in the plot area is determined by dividing the amount of solution required per plot (mL/application area) by the discharge rate (mL/sec), which produces a target time (seconds) for application to the plot.



Figure 2. Speed calibration over a flat terrain using a boom sprayer

7. The sprayer speed (walking or driving) shall be timed over a known distance. Adjust speed to approximate the target time as determined in Step 6, above. Repeat speed measurements two more times for a total of three measurements. Each recorded time shall not vary more than 5% from the average of the 3-run speed measurement. Be sure to conduct the speed calibration on a similar terrain as the test plot (Figure 2) because different terrain can result in faster or slower speeds. During speed calibration, the sprayer does not need to be activated or can be activated with water if desired.
8. Record all data in the field data notebook.
9. If a trial has more than one application, a single calibration recheck is permitted for subsequent applications if application parameters or sprayer settings have not changed. The original 3-run discharge rate will be used for comparison when doing a calibration recheck. If the discharge collected during the recheck is within 5% of the discharge

determined during the initial, 3-run calibration, the spray equipment can be used for the application. If not within 5%, then an inspection of the application equipment, especially nozzle tips, for possible blockage. If the calibration recheck is still not within 5% of the initial 3-run calibration, then a new 3-run calibration must be performed. The average discharge rate from the new 3-run calibration now becomes the "target output" which may necessitate recalculating the target time. The sprayer discharge rate from the most recent 3-run calibration is used when performing the rate confirmation calculation after each application.

Approved by:



October 5, 2026

Anna Gore, Executive Director
Minor Use Foundation

Date

SOP: 6.3 Rev. 1

EFFECTIVE DATE: September 10, 2024

AUTHOR(S): Wilfredo Robles, Edwin Barbosa, and Bill Barney

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TITLE: **Procedures for the Application of the Test Substance**

PURPOSE: To describe the procedures used in the application of a test substance to ensure the rate listed in the protocol is accurately applied.

SCOPE: Applies to all field trials in the Minor Use Foundation's magnitude of pesticide residue studies.

PROCEDURES:

1. All personnel involved in the mixing, application, storage, and cleanup of the test substance should be properly trained in accordance with current policies and guidelines of their institution.

2. When handling pesticides for crop maintenance or test substances for GLP trials, personnel must wear appropriate protective clothing.

3. If the pesticide application is for maintenance of the plots, then apply the pesticide to all the plots in the study according to the directions on the pesticide label.

4. If the pesticide application involves the test substance, then procedures for handling the test substance as indicated in SOP 4.1 should also be followed.

5. Spraying equipment for test substance application should be inspected for leaks, damaged hoses, etc., and calibrated before application. Inspect that the operating fluids such as oil and gasoline, are at recommended levels. Check that all settings for subsequent applications are the same as those of the previously performed calibration.

6. If a 3-run calibration of the application equipment has been performed away from the test plot (following SOP 6.2), upon arriving at the test

plot, perform a calibration recheck to ensure equipment or settings have not changed or been altered during travel due to bumpy roads. Ensure that the sprayer discharge rate is the same as that of the original 3-run calibration. If the recheck calibration is within 5% of the initial, 3-run calibration, then the spray equipment can be used for the application. If the 3-run calibration is made next to the test plot, then a recheck is not needed.

7. Once the test substance and water are mixed and in the spray tank, charge the system far away from the test plots to eliminate risk of contamination to the plots and to fill up the spray lines. Agitate the spray mix before and during application to ensure an even mixing of the test substance and water.

8. Just before entering the test plot, make sure you are traveling at the correct speed. Maintain the correct speed throughout the plot.

9. Apply the spray mixture according to the directions in the protocol or as specified on the label. Calculations should be made to minimize the amount of spray material left in the spray equipment. The amount left on the spray equipment should be sprayed on a similar crop or disposed of according to current policies and guidelines of the research testing facility.

10. Apply the test substance solution while being timed with a stopwatch or a similar device. Begin timing as the activated sprayer enters the plot and stop timing when the activated sprayer exits the plot.

11. For multiple treatments, apply the spray mixture beginning with the lowest concentration and work up to the highest concentration.

12. Based on pass times and discharge rate of the sprayer, perform a rate confirmation calculation (a form is in the field data notebook) to determine whether the application is within the protocol requirement (usually between –5% and +10%). If the calculation shows a deviation beyond protocol requirements, notify the Study Director immediately.

13. For granular formulations of the test substance, application can be made with a spreader (which can be calibrated) that is designed for granular or other dry formulations. For increased accuracy in delivery, if given prior approval by the Study Director, the test substance may be delivered with a gloved hand or a hand-held shaker can (neither of

which can be properly calibrated), making several passes over the test plot to ensure uniform distribution. The plot can also be divided into quadrants, and the test substance can be weighed out in four separate aliquots for more precise application of the dry formulation.

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AUTHOR(S): Wilfredo Robles, Edwin Barbosa, and Bill Barney

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TITLE: **Standardization and Maintenance of Instruments and Gauges**

PURPOSE: Provide guidelines to ensure that instruments and gauges used to generate GLP data are standardized and maintained to give accurate readings.

SCOPE: Applies to all field trials in the Minor Use Foundation's magnitude of pesticide residue studies.

PROCEDURES:

1. Ensure that all instruments used in GLP trials are kept clean at all times and are properly calibrated in accordance with the applicable procedures.
2. Instruments used in GLP field research should be tested to determine that they are accurate to meet the data-recording requirements of professional scientific methods utilized in GLP-regulated studies. At a minimum, standardize each environmental testing instrument once per year. Testing should be completed under conditions similar to those under which the instrument will be used.

3. Testing can include standardizing instruments with comparison to two other like instruments; they should test out at ±5% of the average of all (except wind speed indicators, which will be at ±10%). If one of them is more than 5% different (or 10% for wind meters) than the average, that instrument will not be used and is to be replaced. Standardizing instruments against known constants (e.g., thermometers in ice water slurry, stainless steel weights, etc.) or through certification may also be used for testing the accuracy of instruments and gauges.

4. New instruments are considered calibrated for the period of one year unless the manufacturer specifies another date. Regardless of the accuracy-testing method, document the date of standardization, the equipment identification number of the instrument involved, and the results of the tests. Unless otherwise noted, instruments that have been

standardized are considered to have had adequate maintenance. Any instrument that uses batteries should be replaced annually, or earlier, if needed. When a new instrument is purchased, issue a new ID number for it and mark this number on the instrument.

5. All documentation that has been produced by the standardization and maintenance of these instruments will be recorded in a log, and copies placed in the field data notebook, where applicable.

6. NIST Thermometer

   The NIST mercury-in-glass thermometer is a reference thermometer used when standardizing temperature recording devices, such as a soil or air thermometer. It is used for comparison only and is not used when calculating the average of the temperature recording devices. Other standardizing equipment may be used as long as it is calibrated against a traceable standard and has a valid calibration certificate.

7. Soil and Water Thermometers

   Soil and water temperature are usually measured using a digital thermometer. Standardization is conducted by immersing the probes of at least three digital thermometers in the same container of water and recording temperatures after about two minutes. Include a NIST-certified thermometer for comparison. Results should be within 5% of the average of all thermometers. The NIST thermometer reading is not used when calculating the average; it is used for comparison only but must be within 5% of the average of the digital thermometers. It is recommended to standardize the thermometers under conditions that generally reflect the conditions in which the thermometers will be used. For example, standardize the thermometers in both cold water (e.g., 35 to 45° F) and in warm water (e.g., 65 - 75° F).

8. Instrument for measuring air temperature, relative humidity, and wind speed

   a. A popular instrument used to measure air temperature, relative humidity, and wind speed is a digital Kestrel 3000 or another model by Nielsen-Kellerman. Other instruments are acceptable. Standardization is accomplished by comparing readings from the three like instruments (e.g., three Kestrels) while under the same conditions.

b. To standardize for air temperature and relative humidity, line up the instruments on the same surface, at the same level, under the same conditions. After about 15 minutes, take readings from all instruments for each environmental parameter (i.e., air temp, RH). Results should be within 5% of the average of all three instruments. Instruments should be standardized in the approximate range of the temperatures likely to occur in the field.

c. To standardize for wind speed, align the instruments next to each other on the same surface, aiming them all in the same direction. Conducting the standardization indoors with a fan directed towards the meters facilitates the standardization process. Read all three instruments concurrently and document. Results should be within 10% of the average of all three instruments. It is recommended to standardize the instrument under a range of wind speeds. For example, for a given standardization, altering the distance from the fan that the instruments are placed will give different wind speeds.

9. <u>Temperature-recording devices for Freezers and Test Substance storage and transport</u>

a. It is recommended to use electric temperature recording devices, such as a HOBO, with a temperature range appropriate for warm, cool, or frozen conditions. Use a NIST mercury-in-glass thermometer for comparison. If a HOBO temperature datalogger is not available, a min/max thermometer must be set up within each cabinet and freezer. The temperatures reported from the min/max thermometer will be recorded regularly throughout the trial period.

b. Before use, visually inspect the datalogger for cleanliness and that it is in good working condition. Check the power supply (if applicable, batteries should be replaced when the power indicator light does not blink while the unit is on). Record inspection and any maintenance performed in appropriate logs. Use the following methods or document the methods used as raw data.

c. All dataloggers will be identified with a unique number or code. The identification number or code will be placed on the measuring device such that it can easily be cross-referenced to calibration log records.

d. Data logger(s) to be calibrated and the reference thermometer will be read side by side under conditions appropriate to the intended use.

e. Examples of temperature ranges to test may include:
    i. room temperature (approx. 22°C)
    ii. ice slush (approx. 0°C)

f. Water baths will be contained in a pan or beaker deep enough for adequate immersion of the instrument. The ice bath should be made with chopped ice in water to form a tightly packed slush.

g. The data logger (s) and the reference thermometer will remain in the calibrating environment until a constant reading is reached. When the analyst feels confident that reading is constant, the values will be recorded in the log. The following information will be documented in the log:
    i. date of calibration
    ii. initials of person doing calibration
    iii. reference thermometer reading
    iv. the datalogger temperature reading
    v. identification (ID) or code number of the datalogger being calibrated

h. Temperature reading taken from the reference thermometer may be rounded to whole numbers (e.g.: If reference reads 38.2ºC, the recorded value will be 38ºC).

i. Data from temperature data loggers will be downloaded regularly. The downloaded data will be saved electronically and printed out (hard copy). This data will be retained in an electronic and a copy file as raw data. The following information will be included in the files:
    i. ID code number of the device
    ii. Date
    iii. Routine Maintenance check (satisfactory or not satisfactory)
    iv. Measurements units
    v. Initials of person downloading the data

j. Units will be appropriately maintained. If the unit fails, it will be discarded and replaced by a new one. The only exception is

the changing of batteries and charts or the adjustment of sensor arms during calibration.

10. Balance Calibration
    a. For balances used to weigh a test substance dry formulation, it is recommended that professional calibration and maintenance be performed and certified every year for accuracy.
    b. Adjustments for accuracy can be made by an accredited company certified with the National Institute of Standards and Technology (NIST). The calibration by use of "Known Weights" is acceptable before weighing test substance for the application. Documentation of calibration will be kept on file.
    c. To calibrate
        i. Clear the unit to the point at which the readout is at zero.
        ii. Center the calibration weight on the weighing platform or pan. If adjustments are allowed, adjust the balance until the readout is within +/- 2% of the declared value of the calibrated weight.
        iii. Annotate values on a log for retention in raw data. If recalibration is required and operator-level adjustments are available, it should be done, and the weights remeasured.
        iv. If operator-level recalibration is either not available or not adequate, the unit should be routed for maintenance by a properly trained technician.

Approved by:



October 5, 2026

Anna Gore, Executive Director
Minor Use Foundation

Date