2025 – 2026 New Mexico State University IR-4 Research Program Standard Operating Procedures

table of contents

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signature

03 Jun 2025
date

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05 Jun 2025
date

New Mexico State University IR-4 Research Program
retired, renumbered, & new SOPs

table of contents

retired	renumbered	new
1101.06	✓	10.01.00
1121.08	✓	10.02.00
1142.04	✓	10.03.00
1203.06	✓	50.01.00
1302.04	✓	20.01.00
1303.09	✓	20.02.00
1304.04	✓	20.03.00
1309.18	✓	20.04.00
1401.11	✓	10.04.00
1501.06	✓	30.01.00
1502.02	✓	10.06.00
1511.10	✓	30.02.00
1513.05	✓	30.02.00
1514.00	✓	30.03.00
1601.08	✓	40.01.00
1602.05	✓	40.02.00
1603.07	✓	40.03.00
1604.03	✓	40.04.00
1703.02	✓	10.05.00
2101.13	✓	50.02.00
2102.06	✓	50.02.00
2104.04		
2201.07	✓	50.06.00
2221.09	✓	50.03.00
2401.14	✓	50.04.00
2501.11	✓	50.05.00

SOP: NMSU.10.01.00	*pg 1 of 1*
Title: Personnel records and organizational chart	

Purpose: To inform on maintaining personnel records for individuals engaged in GLP studies. Satisfies 40CFR160.29(b).

Scope: Applies to all personnel conducting GLP trials for the NMSU IR-4 research program.

Procedures:

1. Maintain and make available the following documents in facility records

    1.1. Résumé or Curriculum Vitae (CV) documenting education & experience

    1.2. Training record of training event(s), date(s), presenter(s), and whether GLPs covered

    1.3. Job description(s)

    1.4. Organizational charts within NMSU & Western Region IR-4

2. Review documents approximately biennially, and update if needed.

3. Retain certified copies of outdated documents, including for personnel who leave.

    3.1. Original documents should be sent to IR-4 Headquarters (HQ) approximately biennially for archiving.

4. Temporary workers may be necessary for certain trial activities (*e.g.* plot maintenance, harvesting, tractor work etc). No personnel records are required for this work, but descriptions of how workers were instructed, and the work they performed should be documented in the field data book (FDB; interchangeable with eFDB).

SOP:	NMSU.10.02.00	*pg 1 of 2*
Title:	Generating and revising standard operating procedures (SOPs)	

Purpose: Informs on generating, revising, approval, archiving and use of SOPs. Satisfies 40CFR160.81.

Scope: Applies to all procedures within the NMSU IR-4 research program.

Procedures:

1. National IR-4 SOPs

    1.1. The National IR-4 Program may generate and revise national SOPs

    1.2. NMSU IR-4 research personnel will review, train on, and follow national SOPs

    1.3. National SOPs supersede NMSU IR-4 SOPs, should they conflict

    1.4. NMSU IR-4 research personnel will have national SOPs available during GLP trials

2. NMSU IR-4 SOPs

    2.1. Generating NMSU IR-4 SOPs

        2.1.1. SOPs will contain the following elements, at minimum

            2.1.1.1. Unique SOP identifier: denotes 'facility', 'category', 'number', 'revision', and is separated by a period. The facility is 'NMSU'. Categories include: 10 Administration, 20 Sampling and data collection, 30 Facilities and test system, 40 Test substances and adjuvants, & 50 Equipment. Unique numbers should reflect SOP number and revision numbers reflect revision round
            Ex: NMSU.10.01.03,

            2.1.1.2. Title: Concise overview of SOP topic

            2.1.1.3. Purpose: Explains what SOP is about

            2.1.1.4. Scope: To what / whom SOP applies

            2.1.1.5. Procedures: Detailed instructions personnel should follow

    2.2. Revising NMSU IR-4 SOPs

        2.2.1. A revised SOP will be issued a new revision number to indicate a revision
        Ex: old: NMSU.10.01.**<u>00</u>** → new: NMSU.10.01.**<u>01</u>**

            2.2.1.1. A revision constitutes a substantial change in the meaning and interpretation of the SOP. Grammatical and spelling corrections may be made but need not be recorded with a revision number

2.2.2. SOPs may be merged, given new categories, or rearranged during revision, but a table must be included to cross-refence between old SOPs and new SOPs

2.2.3. Retire SOPs when no longer applicable. Provide a table listing retired SOPs

2.3. Approving NMSU IR-4 SOPs

2.3.1. NMSU IR-4 SOPs must be reviewed approximately biennially and submitted in 'track-changes' format to the Western Region IR-4 Field Office for approval

2.3.2. SOPs must contain signatures of the submitter (NMSU IR-4 program manager) and approver (Western Region IR-4 assistant field coordinator) and signature dates to be approved. The SOPs become effective immediately after approval

2.4. Maintaining and archiving NMSU IR-4 SOPs

2.4.1. Original signed SOPs reside in the facility records, and copies will be maintained in the FRD vehicle or office, and with personnel during research activities

2.4.2. SOPs will be archived at HQ and should be coordinated with HQ approximately biennially.

2.5. Following and using NMSU IR-4 SOPs

2.5.1. NMSU IR-4 research personnel will be trained to follow SOPs

2.5.2. SOPs will be immediately available for reference during research activities

2.5.3. When SOPs conflict with protocols, adhere to protocol instructions

2.5.4. When SOPs are not followed, submit documentation to assess trial impact to Study Director(s) (SDs)

SOP:	NMSU.10.03.00	*pg 1 of 1*
Title:	Certified exact copies	

Purpose: Informs on making certified exact copies. Satisfies 40CFR160.81(b)(10).

Scope: Applies to copies needed for GLP studies within the NMSU IR-4 research program.

Procedures:

1. Certified exact copies are exact, unaltered copies of original data

    1.1. May be provided in color or black and white

    1.2. Must be stamped (or otherwise conspicuously identified) that the copy is a 'certified exact copy' (may be identified with other similar wording, Ex: 'exact copy' etc.)

        1.2.1. Must indicate where the original document is located

        1.2.2. Must contain the initials of the person who verified where the original is located

        1.2.3. Must contain the date the copy was made

        1.2.4. May be identified on the first page of a continuous sequence in a document / file if the number of pages copied is listed.

SOP:	NMSU.10.04.00	*pg 1 of 1*
Title:	File retention and archiving	

Purpose: Informs on retaining and archiving files. Satisfies 40CFR160.190 & 40CFR160.81(b)(10).

Scope: Applies to documents within the NMSU IR-4 research program.

Procedures:

1. Retaining files generated by the NMSU IR-4 research program

    1.1. Trial data and related facility records will be retained by NMSU IR-4 research program as copies for a minimum of 2 years after trial completion

    1.2. Current trial documentation will be organized and securely stored, accessible only to NMSU IR-4 research program personnel.

    1.3. Printed pages from FDBs that need editing for QC or QA reviews will be kept as copies

2. Archiving files generated by the NMSU IR-4 research program

    2.1. Archives are maintained by HQ

    2.2. Files for archiving will be organized with and shipped to HQ approximately biennially

    2.3. Make copies of documents for retention before shipping documents for archiving

    2.4. Include a Chain of Custody (CoC) form when shipping documents for archiving

    2.5. Fill out an *IR-4 Raw Data and Documents Transfer Form*, or similar form, and include: A document inventory being shipped to HQ, name of originator and date of shipment, the shipping service and tracking number of the shipment, prompts for recipient to verify inventory, sign and date

3. Disposing of files generated by the NMSU IR-4 research program

    3.1. Only copies whose originals are archived by HQ may be disposed

SOP:	NMSU.10.05.00	*pg 1 of 1*
Title:	Inspections and audits	

Purpose: Informs on conduct prior, during, and after inspections. Satisfies 40CFR160.15, 40CFR160.35, & 40CFR160.81(b)(10).

Scope: Applies to all reviews of GLP studies and the NMSU IR-4 research program.

Procedures:

1. Quality Assurance Unit (QAU) inspections and audits

    1.1. Follow appropriate National SOPs, where available and applicable

    1.2. When not available follow guidance of the National IR-4 QAU representative

2. Environmental Protection Agency (EPA) inspections and audits

    2.1. Prior to EPA inspection

        2.1.1. Communicate EPA notice of inspection to National IR-4 QAU

        2.1.2. Begin organizing trial notebooks and facility record

        2.1.3. Reserve conference room space for document review

    2.2. During EPA inspection

        2.2.1. Work in cooperation with the National IR-4 QAU representative

        2.2.2. Make available all requested documents

        2.2.3. Be available for questions / facility tours / clarifications

        2.2.4. Respond appropriately and promptly to remedy any minor findings

        2.2.5. Work with National IR-4 QAU representative to address major findings

    2.3. After EPA inspections

        2.3.1. Retain inspection results in the facility records

        2.3.2. If minor findings occur, make appropriate changes to avoid future infractions

        2.3.3. If major findings occur, repeat training and re-inspection if appropriate. Work closely with National IR-4 QAU and the Western Region IR-4 Office to address any short-falls to insure facility and trial integrity.

SOP:	NMSU.10.06.00	*pg 1 of 1*
Title:	Discontinuing the NMSU IR-4 research program	

Purpose: Informs on conduct in the event of discontinuing the NMSU IR-4 research program. Satisfies 40CFR160.51, 40CFR160.190, & 40CFR160.81(b)(10).

Scope: Applies to all NMSU IR-4 research program facilities, equipment, and data.

Procedures:

1. Facilities

    1.1. Access keys will be delivered to Extension Plant Sciences department head with a table matching key to buildings and storage locations

    1.2. Office, lab, and storage space will be cleared and left orderly

    1.3. Remaining chemicals will be disposed of following IR-4 and NMSU procedures

2. Equipment

    2.1. Coordinate with Western Region IR-4 to determine equipment removal or redistribution

    2.2. NMSU equipment access keys will be given to Extension Plant Sciences department head with a table matching key to equipment

    2.3. Equipment will be left clean and orderly

3. Data

    3.1. Coordinate with HQ to ensure proper archiving of data and facility records

    3.2. Coordinate with SDs regarding ongoing trials

SOP:	NMSU.20.01.00	*pg 1 of 1*
Title:	Recording and rounding raw data	

Purpose: Informs on recording raw data and rounding numerical data. Satisfies 40CFR160.51, 40CFR160.190, & 40CFR160.81(b)(5) & (10).

Scope: Applies to all good laboratory practice (GLP) study data generated by NMSU IR-4 research program facilities.

Procedures:

1. Data recording

    1.1. Written data

        1.1.1. Record data promptly, legibly, and in indelible ink and correct discovered errors.

            1.1.1.1. Draw a single line through the error, enter an error code outlined in the FDB or defined by research personnel, initial, and date the newly entered data

            1.1.1.2. Code missing data insertions as late entries and add date data should have been entered, in addition to initials and date entry was entered.

    1.2. Digital data

        1.2.1. Graphs or figures may be generated digitally for plot designs and equipment

        1.2.2. Digital data recording/corrections must comply with appropriate National SOPs, such as N-02 on electronic field data book use.

    1.3. GLP compliant data

        1.3.1. Test substance measuring, test substance environmental monitoring, adjuvant data, and sample environmental monitoring data must be GLP compliant and generated by calibrated or verified NIST (National Institute of Standards and Technology) devices

    1.4. Non-GLP compliant data

        1.4.1. Soil data, daily meteorological & irrigation records, trial site history, maintenance chemicals & cultural practices, sample weighing need not be GLP compliant

2. Data rounding

    2.1. Written data

        2.1.1. Data rounding should be left to the final calculation to ensure accuracy. Round to the hundredths position (*e.g.* 10.31**2**5 → 10.3**1** & 560.45**8**23 → 560.4**6**)

    2.2. Digital data

        2.2.1. Digital rounding may be by digital devices or to hundredths position as needed.

SOP:	NMSU.20.02.00	*pg 1 of 2*
Title:	Collecting environmental and crop data	

Purpose: Informs on collecting environmental and crop related data. Satisfies 40CFR160.51, 40CFR160.190, & 40CFR160.81(b)(4), (5), & (10).

Scope: Applies to all GLP field data generated by NMSU IR-4 research program facilities.

Procedures:

1. Collecting environmental data

1.1. During trial applications

1.1.1. Soil data

1.1.1.1. Temperature data

1.1.1.1.1. Insert probe 3" ± 1" in plot soil (field) or potted soil (greenhouse), allow for acclimation (ca. 1 min.), record data, remove and clean probe

1.1.1.2. Moisture data

1.1.1.2.1. Sub-surface may be reported, surface is estimated

1.1.1.3. Tilth data

1.1.1.3.1. Tilth may be visually estimated and recorded

1.1.2. Meteorological data

1.1.2.1. Wind speed, relative humidity, air temperature

1.1.2.1.1. Use a Kestrel (or similar) device to measure parameters inside test plot area and at or near target boom height for applicator equipment

1.1.2.1.2. Report averages or ranges if measurements actively fluctuate

1.1.2.2. Wind direction and cloud cover

1.1.2.2.1. These parameters may be visually assessed

1.2. Daily meteorological data throughout trial production cycles

1.2.1. Weather stations

1.2.1.1. Obtain daily meteorological data from NMSU weather stations associated with agricultural experiment stations. Download data for the appropriate period (earliest planted crop – latest harvested crop) and retain data in facility records. Periodic clearing of cache may be necessary to access data online. For issues retrieving data contact Stanley Engle or the Experiment Station Manager.

1.2.2. Irrigation

1.2.2.1. If an accurate meter exists, use meter data, otherwise irrigation data may be estimated and generally equates to ~ 6 acre inches per flood irrigation event.

2. Collecting crop data

2.1. During trial applications

2.1.1. Crop height

2.1.1.1. Measure with ruler or estimate visually

2.1.2. Crop growth stage

2.1.2.1. Use crop specific terminology, or describe generally as ungerminated, seedling, vegetative, flowering, or fruiting / mature

2.1.3. Crop vigor

2.1.3.1. Assess visually as poor, variable, fair, or good. Notify SD and seek crop specific advice if crop is poor. Monitor closely if crop is variable

2.1.4. If applicable, estimate plant surface moisture as damp, dry, or saturated, and canopy coverage as percentages

2.2. After trial applications

2.2.1. Phytotoxicity data

2.2.1.1. Observe crop post-application appropriately (1 day – 1 week) and assess differences between non-treated and treated plots to rate phytotoxicity from 0-no effect to 5-crop death.

2.2.1.1.1. Send images and symptom descriptions of phytotoxicity ratings >0 to the SD.

SOP:	NMSU.20.03.00	*pg 1 of 1*
Title:	Soil sampling	

Purpose: Informs on collecting soil for standard sampling. Satisfies 40CFR160.81(b)(5).

Scope: Applies to soils used by NMSU IR-4 research program facilities.

Procedures:

1. Soil sampling

    1.1. Soil characteristics should generally be obtained via NRCS data for test sites, but may be obtained from a soil analysis if resources / reasons justify soil laboratory analyses

        1.1.1. Identify 5 – 10 sampling areas throughout the entire test site

        1.1.2. Take samples at a depth of 6” – 8”, combine, homogenize, and label sample(s)

        1.1.3. Select an appropriate soil testing facility for analysis and ship sample(s)

SOP:	NMSU.20.04.00	*pg 1 of 4*
Title:	Sample collection, storage, and shipping	

Purpose: Informs on conduct during sample collection, storage, and shipping for individual GLP trials. Satisfies 40CFR160.51, & 40CFR160.81(b)(5), (8), (10), & (11).

Scope: Applies to samples for GLP studies at NMSU IR-4 research program facilities.

Procedures:

1. Sample collection

1.1. Prior to sampling

1.1.1. Determining commercial maturity

1.1.1.1. If necessary, test the crop to determine readiness to sample. Tests might include measurements of moisture content and should be made with appropriate equipment designated for treated and untreated plots.

1.1.2. Avoiding contamination

1.1.2.1. Ensure all tools, ice chests, receptacles, etc., are sufficiently clean to avoid contamination, and/or designated for treated and untreated samples

1.1.2.2. Do not wear contaminated clothing

1.1.2.3. In 0 day phi trials, if possible, collect untreated plots prior to any applications

1.1.2.4. Ensure sample bags are fresh and not contaminated

1.2. During sampling

1.2.1. Label containers with sample IDs to avoid mixing and fill in sample bag labels

1.2.2. Begin harvesting untreated plots first

1.2.3. Wear clean gloves if necessary while collecting treated samples. Collect all samples in a separate run beginning with untreated plots. Sample evenly throughout the plot or on a plant to get unbiased samples. Do not sample in plot ends. Outside rows may also be excluded from sampling

1.2.4. Ensure clean samples, but don't jeopardize residue analyses by washing / rubbing

1.2.5. Place a min / max thermometer with samples to monitor temperature

1.2.6. If samples need to be dried or processed, place in sample bags after processing

1.2.7. Sample weight is verified by a non-GLP scales

1.2.7.1. If weight is below the minimum required amount, notify SD

1.2.8. If weight exceeds maximum, ask SD about reducing to obtain desired weight, otherwise, notify the receiving lab of excess weight

1.2.9. Place filled sample bags in designated ice chests with min / max thermometers

1.3. After sampling

1.3.1. Clean all equipment completely and store separately to avoid contamination

1.3.2. Transport samples to long-term storage as quickly as possible. For longer distances / periods monitor temperatures or supply adequate dry ice for freezing

2. Sample storage

2.1. Intermediate storage – any location other than sample freezers

2.1.1. Always monitor with min / max thermometers

2.2. Long-term storage – sample freezers

2.2.1. Use designated freezers for treated and untreated samples. If storing treated and untreated samples in the same freezer is unavoidable, seek advice from the SD and separate treated and untreated samples by physical barriers or extra bagging

2.2.2. Freezer contents

2.2.2.1. Maintain a freezer contents log for each freezer used for storing samples, record all sample entries and removals with initials, times, and dates

2.2.3. Freezer maintenance

2.2.3.1. Record all routine and non-routine maintenance with initials and dates. Routine maintenance may include de-frosting if not automatic. Non-routine maintenance may include replacing parts. Battery replacement on temperature monitoring devices is not maintenance

2.2.3.2. The freezer backup battery for freezers in SKH W125 is in the panel box of the alarm system in Skeen WT 148 Communications and is managed by NMSU Facility Services (FS). The battery will be checked approximately biennially and when no contents are in the freezers. Schedule testing with FS (575-646-7070) when freezers are on. Results should read above 4.55 Amp Hrs. Replace battery when Amp Hrs drop below 4.55 Amp Hrs.

2.2.4. Freezer temperature monitoring

2.2.4.1. Freezers will be monitored by 2 calibrated or verified NIST thermometers

2.2.4.1.1. A data logger and a min / max thermometer should be used in conjunction to monitor temperatures and ensure sample integrity

2.2.4.1.2. Temperature records may be downloaded and printed if needed via Traceable® platform for the deployment period

2.2.4.1.3. Temperatures will be recorded from min / max thermometers approximately weekly with initials and dates when freezers contain samples

2.2.4.1.4. Thermometers whose calibration has expired may be verified by a calibrated NIST thermometer or be recalibrated. Verification should include 3 temperature ranges and passes if within ± 2°C. Record the locations and temperature of the calibrated and tested devices with initials and dates. Replace failed thermometers.

2.2.4.1.5. Thermometers equipped with out-of-range alarms will be tested at verification or after calibration. Record if the alarm and notification system was successful. Replace failed thermometers

2.2.5. Freezer failure

2.2.5.1. If freezers fail, locate a suitable temporary replacement with secure access and transport samples while maintaining frozen state. Equip the temporary freezer with suitable temperature monitoring devices and alarm devices

2.2.5.2. If a temporary non-GLP freezer is used, treat it as 'borrowed equipment'

2.2.5.3. When freezers malfunction, document times, temperature ranges, and procedures followed to ensure sample integrity.

2.2.6. Replacing or acquiring new freezers

2.2.6.1. Newly acquired or replaced freezers will be issued a unique identifier and tested before being used to store samples. Freezers in other locations may have alternative, appropriate backup systems to ensure sample integrity

3. Sample shipping

3.1. Prior to shipping

3.1.1. Ideally arrange shipment with ACDS or appropriate courier

3.1.2. Ascertain correct laboratory facility receiving samples and notify lab personnel

3.1.3. Prepare boxes, bills of lading, appropriate residue sample shipping information, and residue sample CoC forms

3.2. During shipping

3.2.1. Record date and time samples were packaged (removed from freezer)

3.2.2. Record date and time samples were given to courier service

3.2.3. Shipping weights should not exceed 70lbs.

3.2.4. Place CoC form, and sample arrival check sheet in a protective bag in the box

3.2.5. Seal boxes with packing tape

3.2.6. Ship Mon – Wed and avoid shipping around holidays unless via freezer truck

3.2.7. Notify receiving lab that shipments were made and when they should expect them

3.3. After shipping

3.3.1. Verify sample arrival, integrity, and note any issues with receiving labs

3.3.2. Submit any necessary protocol deviations to address shipping issues

SOP: NMSU.30.01.00	*pg 1 of 1*
Title: Facility floor plans	

Purpose: Informs on contents to be included in the facility floor plan. Satisfies 40CFR160 Subpart C, & 40CFR160.81(b)(10).

Scope: Applies to physical spaces used for GLP studies at the NMSU IR-4 research program.

Procedures:

1. Keep updated the following floor plans in the NMSU IR-4 facility records

    1.1. A map of New Mexico State University Main Campus

        1.1.1. Label Skeen Hall, or any buildings used for GLP research

    1.2. Skeen Hall floor plan

        1.2.1. Obtain blueprints of all floors associated with IR-4 in Skeen Hall

        1.2.2. Label locations of EPS and PES main offices, IR-4 freezers and sample storage, shipping dock where test substance arrives, freezer backup battery, IR-4 personnel offices, IR-4 program direct supervisor office

    1.3. Directions from main campus to trial site

        1.3.1. Display both a map and written instructions on how to arrive at the test site

    1.4. A map of the test site(s)

        1.4.1. Label locations of test site entrance, irrigation source, meteorological station, north direction, distance from entrance to test plot area, any IR-4 pertinent buildings and uses (*e.g.* IR-4 test substance storage etc.)

    1.5. A map and NRCS soil map and composition analysis of the test plot area(s)

        1.5.1. Label IR-4 area(s) used for research, including north direction, slope, and irrigation outputs (*i.e.* risers, center pivots, etc.). Trial placements should not be labeled. They are suited only for the FDB, as they are trial specific

        1.5.2. For soil map, include soil type and % sand, silt, and clay composition, % organic matter, pH (water), cation exchange capacity (CEC-7)

2. Floor plans should be initialed and dated upon entry into facility records

    2.1. Review roughly biennially to maintain accuracy. If floor plans have not changed, the code ‘NC’ (no change) may be entered with the date and initials floor plan was reviewed

3. Replace promptly when areas / facilities change location to reflect accuracy

4. Floor plans may be provided in color or black and white so long as they are legible

Purpose: Informs on the preparation, maintenance, and care of test plot areas. Satisfies 40CFR160.43, 40CFR160.45(d), 40CFR160.90, & 40CFR160.81(b)(1), (2), (4), (6), (7), (9), & (12).

Scope: Applies to test plot areas used for GLP studies at the NMSU IR-4 research program.

Procedures:

1. Test system preparation

    1.1. Establish test plots according to protocols mimicking as closely as possible commercial practices for ground preparation, seeding or transplanting, pre-emergent treatments, etc.

    1.2. Seek SDs guidance if uncertain about pre-emergent treatments or placement of trials with potentially conflicting (substantially similar) chemistries

    1.3. Avoid contamination by placing control plots upwind or upslope from treated plots

    1.4. Prepare test plot maps by measuring the distance of 2 corners of treated and untreated plots to the nearest permanent marker. Include buffer distances between treated and untreated plots, and plot dimensions. This must be done before the 1st application

        1.4.1. Measure distances with a tape measure, or another suitable accurate device

    1.5. Clearly label test plots with signs that include the field ID number, treatment, chemical, crop, application rate, responsible IR-4 personnel name and contact information

2. Test system maintenance

    2.1. Ensure a healthy, commercially marketable crop by performing needed fertilization, irrigation, scouting, and pest control measures

    2.2. Maintain trial site history logs that identify when applications were made to crops grown in the field for at least 1 year. Include rates, trade names, and active ingredients

    2.3. Maintain cultural practice logs that identify when and what operations were done. Include equipment or personnel and depth into soil

    2.4. Maintain irrigation records, including dates and amounts applied

    2.5. Farm bills may generally serve as activity logs, record any relevant activity if not performed by the farm in a calendar for reference. Highlight or otherwise mark the sections that apply to the trial.

3. Test system care

    3.1. Plots presenting biotic stress (*i.e.* weeds, pathogens, nematodes, insects, viruses, etc.)

3.1.1. The FRD is responsible for ensuring a healthy crop. If pests occur, scout regularly until treatment thresholds are met. Arrange for plots to receive an appropriate pesticide application. Record activity in a maintenance fertilizer and pesticide log including the date and rate of application, the active ingredient and trade name, and the purpose of the treatment

3.2. Plots presenting abiotic stress (*i.e.* nutrient deficiencies, heat stress, water stress etc.)

3.2.1. The FRD is responsible for ensuring a healthy crop. If abiotic stressors occur, the FRD will work to remedy them. Generally, fertilization, irrigation, or fertigation alleviate most abiotic stress in crops. Record fertilization and fertigation events in a maintenance fertilizer and pesticide log including the date and rate of application, the active ingredient and trade name, and the purpose of the treatment

3.3. Moribund or dead plots

3.3.1. If plots are beyond saving, inform the SD

3.3.2. If a biological cause is suspected, obtain adequate plant tissue samples and seek advice on effective crop destruction or removal

3.3.2.1. Submit tissue samples to an appropriate plant diagnostic clinic for necropsy and histopathological analyses to identify the cause. Implement required treatment measures to reduce future crop damage

3.3.3. If caused by natural disaster or unsuitable environmental conditions, consider alternative locations or discontinuing trials involving the test crop

3.4. Crop destruct

3.4.1. Plots treated with unregistered chemicals

3.4.1.1. Crop must be destroyed. Generally, this is accomplished by tilling crop residues into the soil. If this is not feasible, take appropriate actions to ensure treated crops never enter the food chain

3.4.2. Plots treated with registered chemicals

3.4.2.1. Crop may be destroyed, or may honor registered label restrictions including rate and pre-harvest intervals

3.4.3. Document crop destruct measures in trial notebooks

SOP: NMSU.30.03.00	*pg 1 of 1*
Title: Greenhouses	

Purpose: Informs on greenhouse considerations when designing greenhouse test plots. Satisfies 40CFR160.43, 40CFR160.45(d), 40CFR160.90, & 40CFR160.81(b)(1), (2), (4), (6), (7), (9), & (12).

Scope: Applies to greenhouses used for GLP studies at the NMSU IR-4 research program.

Procedures:

1. Greenhouse preparation

    1.1. Secure adequate greenhouse space at the Weed Science Building at Leyendecker or other appropriate facility. They must be equipped to maintain temperature, humidity, irrigation, and lighting appropriate for plant growth and development

    1.2. Treated and untreated plots must be sufficiently physically separated (either by buffers or barriers) to prevent cross-contamination

    1.3. Equip with environmental monitoring devices to record daily temperature and humidity

2. Greenhouse maintenance

    2.1. Maintain logs similarly to other test systems per SOPs

    2.2. Pesticide applications

        2.2.1. If greenhouse is shared, or undivided, remove plants for pesticide applications

        2.2.2. Mark plot (pots or trays) ends while trays are on the table

        2.2.3. Remove trays and align consistently such that trays may be returned to their original position, and plot ends are at the beginning and ending of any spray paths

        2.2.4. Collect environmental data during applications per SOPs

        2.2.5. Allow residue to dry before returning trays to their original position in greenhouse

3. Greenhouse care

    3.1. Care for test plots similarly to other test systems per SOPs

    3.2. Clear and clean paths, tables, and workspaces regularly to maintain safety

SOP: NMSU.40.01.00	*pg 1 of 2*
Title: Test substance receipt, storage, and disposal	

Purpose: Informs on conduct for test substance receipt, storage, and disposal. Satisfies 40CFR160.41(d), 40CFR160.47(a)(1) & (b), 40CFR160.83, & 40CFR160.81(b)(3), & (10).

Scope: Applies to test substances used in GLP studies at the NMSU IR-4 research program.

Procedures:

1. Test substance (TS) receipt

    1.1. Coordinate required TS amount and verify delivery address with SD

    1.2. Place a calibrated or verified NIST min / max thermometer where TS will be delivered, should the FRD be away greater than 3 days after TS receipt, in order to monitor temperature. Note the serial number, temperature range, and dates on the CoC if in temporary location more than 3 days

    1.3. Maintain a TS receipt log. In a well-ventilated area, open the package to verify TS identity and integrity. Log information including, name on container, batch or lot number, expiration date (if known) and date source, storage conditions, GLP status and source, courier and tracking number, approximate amount and number of containers, container description and condition, and the date received. Also check that the concentration of the active ingredient listed on the Certificate of Analysis (CoA) matches the concentration listed in the protocol. This information may be recorded on the CoC and forwarded to the SD and registrant as proof of receipt.

        1.3.1. If TS is observed more than 3 days after receipt, list where it was held, for how long, and include min / max temperatures from an appropriate thermometer

    1.4. Document receipt and condition of TS in CoC and notify registrant and SD

2. Test substance storage

    2.1. Short-term storage

        2.1.1. TS may be stored in an appropriate short-term location provided it has secured access, is environmentally suitable, is removed from the test system, and is equipped with a NIST calibrated or verified min / max thermometer. Short-term storage is suitable for TS aliquots or if FRD is absent during TS receipt

    2.2. Long-term storage

        2.2.1. Store TS appropriately in well-ventilated, climate-controlled area, clearly labeled as a pesticide storage facility with secure restricted access to IR-4 personnel

        2.2.2. Maintain storage facility temperature logs

2.2.2.1. Equip facility with 2 NIST calibrated or verified min / max thermometers. One will serve as the primary source of data, note serial number. Conditions permitting, a Traceable® Live device may allow for remote monitoring

2.2.2.2. Record temperatures no more than weekly but no less than approximately monthly and initial and date to signify who and when temperatures were recorded

2.2.2.3. At any point, if storage conditions do not comply with container recommendations, contact the SD to ensure TS integrity

2.2.2.4. Though calibrated, NIST min/max thermometers may very occasionally inaccurately record data. Therefore, it's best to have 2 min/max devices to verify accuracy

2.3. In-use storage

2.3.1. Store TS appropriately when needed during an application or at another facility

2.3.2. In clean, insulated containers designated for pesticides, place blue ice and a NIST temperature monitoring device to monitor temperature fluctuation

2.3.3. Record min / max temperatures reached during transport and return TS to long-term storage facilities as early as possible

2.3.4. If TS aliquots are transported, store aliquots in an appropriate container labeled to indicate identity, storage requirements, and expiration date. Transport with label

3. Test substance disposal

3.1. Retain TS containers until study is concluded, following the relevant National SOP. Any remaining TS may be used for maintenance application in accordance with and provided the TS us is registered

3.2. Periodically remove TS to allow unobstructed, orderly access to long-term storage facility in accordance with National SOPs, as well as local, state and federal laws. Periodically, the New Mexico Department of Agriculture holds pesticide disposal events to dispose of pesticides. Disposal may be recorded in the TS log

SOP: NMSU.40.02.00	*pg 1 of 2*
Title: Calculating pesticide doses	

Purpose: Suggestions on calculation steps during tank mixing, application, and post-application. Satisfies 40CFR160.47(a)(2) & (3), 40CFR160.83, & 40CFR160.81(b)(3), & (10).

Scope: Applies to chemicals used in GLP studies at the NMSU IR-4 research program.

Procedures:

1. Target output and target speed

   1.1. Determine plot size in **acres:** $\frac{len \quad (ft) * width\ (ft)\left(\frac{ft^2}{plot}\right)}{43560\ \frac{ft^2}{acre}} = \boldsymbol{\frac{acres}{plot}}$

   1.2. Find desired output in **mL plot^{-1}:** $\frac{acres}{plot}$ (1.1.) $* \frac{gallons}{acre}$ $(GPA) * \frac{3785\ mL}{gallon} = \boldsymbol{\frac{mL}{plot}}$

   1.3. Find average boom discharge rate **mL sec^{-1}:** $\frac{total\ catchment\ volume\ (mL)}{total\ catchment\ time\ (sec)} = \boldsymbol{\frac{mL}{sec}}$

   1.4. Determine required **pass time plot^{-1}**: $\frac{\frac{mL}{plot}\ (1.2.)}{\frac{mL}{sec}\ (1.3.)} = \boldsymbol{\frac{sec}{plot}}$

   1.5. Determine **# of passes**: $\frac{field\ width\ (in/cm)}{n\ nozzles * 20"\ spacing\ (in/cm)} = \boldsymbol{\#\ of\ passes}$

   1.6. Find **time pass^{-1}**: $\left(\frac{\frac{sec}{plot}\ (1.4.)}{\frac{\#\ of\ passes}{plot}\ (1.5.)}\right) = \boldsymbol{\frac{sec}{pass}}$

2. Liquid TS amount

   2.1. Find target volume **mL plot^{-1}:** $\frac{acres}{plot}$ (1.1.) $* target\ rate\ \left(\frac{form.,mL}{acre}\right) = \boldsymbol{\frac{mL}{plot}}$

   2.2. Calculate overage factor and required volume:

$$\frac{total + \ excess\ tank\ volume\ (mL)}{desired\ output\ (1.2.)\ \left(\frac{mL}{plot}\right)} = \boldsymbol{overage\ factor}$$

$$overage\ factor * target\ volume\ (2.1.)\ \left(\frac{mL}{plot}\right) = \boldsymbol{required\ volume\ (mL)}$$

3. Solid TS amount

   3.1. If given the **grams test substance (product) / Acre** use:

   $\frac{\text{grams product}}{\text{Treatment}} = \frac{\text{given grams product}}{\text{Acre}} \times \frac{\text{1 Acre}}{\text{43560 ft}^2} \times \frac{\text{[Plot area (ft}^2\text{) x overage]}}{\text{Treatment}}$

3.2. Convert desired rate into **grams a.i. / acre** :

$$\text{Rate (grams a.i./acre)} = \frac{\text{Rate (lb a.i.)}}{\text{Acre}} \times \frac{454\ \text{g}}{1\ \text{lb}}$$

3.3. Find **grams test** substance / **gal carrier** using the following formula:

$$\frac{\text{grams test substance}}{\text{gal carrier}} = \frac{\text{Rate (grams a.i.)}}{\text{Acre}} \times \frac{1}{\%\ \text{a.i.*}} \times \frac{\text{Acre}}{\text{gal carrier}}$$

***** % a.i. expressed as a decimal

3.4. Find grams **test substance / treatment** using the following formula:

$$\frac{\text{grams test substance}}{\text{Treatment}} = \frac{\text{grams test substance}}{\text{gal carrier}} \times \frac{\text{Mix size (gal carrier)}}{\text{Treatment}}$$

4. Adjuvant amount

4.1. Determine mean recommended rate of adjuvant **v/v %**: $\frac{pints}{gallons * \frac{8\ pints}{gallon}} = \boldsymbol{v/v}\ \%$

4.2. Determine required adjuvant volume (**mL**) for mix:

$$(4.1.) * (2.2.)\ (mL) = \boldsymbol{mL\ adjuvant}$$

5. Carrier amount

$$required\ (mL) + overage\ (mL) - TS\ volume\ (mL) - adjuvant\ (mL) = carrier\ (mL)$$

6. Post-application calculations

6.1. Applied volume **mL plot^{-1}**:
$total\ pass\ time\ (\text{sec}\ plot^{-1})\ discharge\ rate\ (mL\ sec^{-1}) = applied\ volume\ (\boldsymbol{mL}\ plot^{-1})$

6.2. Applied TS **mL**: $volume\ (6.1.) * \frac{TS\ in\ mix\ (mL)}{tank\ mix\ (mL)} = \boldsymbol{applied\ TS\ (mL)}$

6.3. Applied rate **mL acre^{-1}**: $applied\ substance (6.2.) * \frac{43560\ ft^2}{plot\ area\ ft^2} = \textbf{rate}\ \left(\frac{\boldsymbol{mL}}{\boldsymbol{acre}}\right)$

6.4. Actual **GPA rate:** $\frac{applied\ volume\ (mL)}{3785\ \frac{mL}{gal}} * \frac{43560\ ft^2}{plot\ area\ ft^2} = \boldsymbol{GPA}$

6.5. Accuracy: $\frac{applied\ rate\ \left(\frac{mL}{acre}\right)}{target\ rate\ \left(\frac{mL}{acre}\right)} - 1 * 100 = \pm\ \%\ accuracy$

SOP: NMSU.40.03.00	*pg 1 of 2*
Title: Dispensing test substance and tank mixing	

Purpose: Informs on dispensing test substances and tank mixing. Satisfies 40CFR160.107, 40CFR160.113, 40CFR160.47(a)(2), 40CFR160.83, & 40CFR160.81(b)(3), & (10).

Scope: Applies to test substances and tank mixes used in GLP studies at the NMSU IR-4 research program.

Procedures:

1. Dispensing test substance

    1.1. Before dispensing, consult label and don required personal protective equipment

    1.2. Maintain a test substance use log

        1.2.1. Record amount, date removed, purpose, and initial and date when recorded

    1.3. Use suitable device(s) or GLP maintained equipment

        1.3.1. GLP maintained balances are generally suitable for dry formulations

        1.3.2. Syringes are device(s) suitable for liquid formulations, dispose after single use

        1.3.3. Do not enter TS containers with used, unclean objects

    1.4. Aliquots for distant trials

        1.4.1. Choose appropriate temporary containers that eliminate leaking or volatilization risk. Label containers to indicate identity, storage requirements, and expiration date. Ideally place in a sealed Ziploc bag inside another Ziploc bag containing the TS label. Always transport with the label

        1.4.2. Dispense as closely as possible the required amount needed for the application(s)

    1.5. In the field at trial location

        1.5.1. Only liquid formulations should be dispensed in the field

        1.5.2. Generally original containers are transported within short distances from the long-term storage facility. Store according to and with label and SOPs

2. Tank mixing

    2.1. Verify carrier pH using strips, take appropriate steps if outside of desired range

        2.1.1. Usually a pH of around 7.0 is preferred

    2.2. Mixing order

2.2.1. Defer to label or registrant instructions for specific mixing requirements

2.2.2. If no specific instructions, and when mixing two or fewer formulations follow:

2.2.2.1. Carrier to ≥ 50% volume

2.2.2.2. TS

2.2.2.3. Adjuvant

2.2.2.4. Carrier to 100% volume

2.2.3. If there are no specific instructions for mixing multiple formulation types, follow the WALES method for mixing:

2.2.3.1. Carrier to roughly 50% volume + compatibility agent if needed

2.2.3.2. Wettable powders, water dispersible granules, dry formulations

2.2.3.3. Agitate and mix thoroughly

2.2.3.4. Liquid formulations, flowables, microencapsulations

2.2.3.5. Emulsifiable concentrates

2.2.3.6. Surfactants

2.2.3.7. Carrier to 100% volume

2.3. Liquid formulations

2.3.1. Dispensing with syringes is preferred when mixing to reduce spill and cleaning

2.3.2. In absence of syringes, if possible use portions of pre-measured remaining carrier to triple rinse measuring equipment adding each rinsate to tank mix, simultaneously cleaning equipment and adding correct carrier and TS amounts

2.4. Dry formulations

2.4.1. Use GLP maintained balances to measure appropriate TS amount

2.4.2. Verify balance accuracy by recording readings of standardized weights above and below the TS weight

2.4.3. Add portions of pre-measured remaining carrier to dissolve dry formulations. Use carrier to also triple rinse measuring equipment adding each rinsate to tank mix, simultaneously cleaning equipment and adding correct carrier and TS amounts

SOP: NMSU.40.04.00	*pg 1 of 1*
Title: Adjuvants	

Purpose: Informs on acquiring, storing, and using adjuvants. Satisfies 40CFR160.107, 40CFR160.113, 40CFR160.47(a)(2), 40CFR160.83, & 40CFR160.81(b)(3), & (10).

Scope: Applies to adjuvants used in GLP studies at the NMSU IR-4 research program.

Procedures:

1. Adjuvant receipt

    1.1. Acquire adjuvants from a reputable supplier

    1.2. Label containers with date received and if no expiration date is provided by the manufacturer assign an expiration date no less than 3 and no more than 5 years, as well as the name, concentration, and storage conditions (if not already contained on label)

2. Adjuvant storage

    2.1. Short-term storage

        2.1.1. When transported for field trials, store suitably and with TS if possible

    2.2. Long-term storage

        2.2.1. Store in a secured-entry facility designated for pesticides. Ideally store in same location as TS with temperature monitoring

        2.2.2. Periodically dispose expired or compromised adjuvants according to regulations. Adjuvants may also be donated to the Experiment station for their use

3. Adjuvant use

    3.1. GLP adjuvants should be dispensed and mixed following TS SOPs

    3.2. When larger quantities of adjuvant are required, pour an aliquot in clean, single-use plastic cup. Withdraw the required amount with a syringe and discard any remainder appropriately

SOP: NMSU.50.01.00	*pg 1 of 1*
Title: Equipment maintenance	

Purpose: Informs on processes for maintaining proper equipment. Satisfies 40CFR160.63, & 40CFR160.81(b)(10), & (11).

Scope: Applies to equipment used for applying TS and storing samples for GLP studies at the NMSU IR-4 research program.

Procedures:

1. NMSU IR-4 personnel are responsible for ensuring equipment function and suitability for use in GLP studies, through routinely inspecting, cleaning, testing / verifying, or calibrating

    1.1. If borrowed or leased during a critical phase, follow procedures for borrowed equipment

2. Newly acquired application or sample storage equipment will be assigned and labeled with a unique identifier

    2.1. If warranted, FRD will generate SOP(s) outlining use and maintenance procedures, and until such time, will operate equipment following manufacturer operating manuals

3. Maintain a maintenance log of routine and non-routine maintenance at minimum in facility records. This log may include equipment use to improve traceability but is not required. The log should record the type (whether routine or non-routine), and nature / reason (specific actions taken: ‘cleaning’, ‘replacing faulty parts’, ‘use’, etc.), initials of the person ordering or performing activities, and the date completed, SOP(s) followed, & activity description

    3.1. Routine maintenance

        3.1.1. Maintenance due to normal wear and tear or routine activities. Examples might include checking assembly and operation, calibrating, cleaning, replenishing etc.

    3.2. Non-routing maintenance

        3.2.1. Maintenance that occurs due to unforeseen or unavoidable equipment failure. Examples include replacing damaged / malfunctioning parts

SOP: NMSU.50.02.00	*pg 1 of 3*
Title: Boom sprayers	

Purpose: Informs on boom sprayer use. Satisfies 40CFR160.63, & 40CFR160.81(b)(10), & (11).

Scope: Applies to all boom sprayers (collectively as propellant, mix tank, and boom) used for GLP studies at the NMSU IR-4 research program.

Procedures:

1. Backpack CO_2 sprayers

1.1. Equipment check

1.1.1. Ensure equipment components (backpack apparatus, boom, CO_2 tank, and mix tank) function properly by inspecting parts (gauges, hoses, connections, and valves) prior to use. Briefly, fill mix tank with water, connect all parts, and turn on CO_2 propellant. Attempt to spray and check parts and for desired spray pattern

1.1.1.1. Refill CO_2 when needed

1.1.1.2. Replace any damaged or leaking parts

1.1.1.3. Calibrate or recheck output

1.1.1.3.1. Follow protocol guidelines for output calibration. Charge boom. Output calibrations should measure discharge of each nozzle 3 consecutive times for around 30 sec each. When transferring catchments for more precise measurements, ensure most droplets are captured

1.1.1.3.2. Follow protocol guidelines for speed calibration. Personnel should perform speed calibrations and rechecks within the test plot area while wearing appropriate PPE and holding boom at desired height to get accurate measures on time. Unless unfeasible, time 3 passes from beginning to end of plot

1.1.2. To shut off and store spray equipment: turn off CO_2 , relieve pressure, empty water, disconnect parts, store properly

1.2. Use

1.2.1. Follow all relevant equipment check SOPs and TS mixing SOPs

1.2.2. Transport in a manner that minimizes damage risk (secured or at slow speeds)

1.2.3. Monitor for equipment failure and discontinue application if a malfunction occurs. Attempt to remedy any problems that may arise

1.2.3.1. For operator errors (trips, slip of grip, etc.) that affect spray output/pattern, mark the affected area with flags, continue application, and do not sample from this area. Notify SD to assess study impact

1.2.3.2. Clean equipment by depressurizing the system and dilute tank mix with water and dispose. Triple rinse mix tank with water, fill a 4th time and spray clean water to clean delivery lines and nozzles

1.2.4. Store equipment to allow for evaporation / prevent foreign objects in hoses

1.3. Maintenance

1.3.1. Record any maintenance in the appropriate log

1.3.1.1. Routine maintenance is generally achieved through trial-related activities

1.3.1.2. Non-routine maintenance may involve replacing gauges or valves or changing boom configurations to increase / decrease swath width (not nozzles)

1.3.2. Replacing nozzles, meshes, or washers is not considered maintenance

1.4. Storage

1.4.1. Store equipment in an appropriate secured entry facility, generally the Weed Science Laboratory located at Leyendecker Plant Science Research Center

2. Tractor mounted CO_2 sprayers

2.1. Equipment check

2.1.1. Follow relevant backpack CO_2 sprayers procedures

2.1.2. Organize with agricultural experiment station staff for tractor availability

2.2. Use

2.2.1. Follow relevant backpack CO_2 sprayers procedures

2.2.2. Note gear and throttle settings to ensure accurate, consistent applications

2.3. Maintenance

2.3.1. Follow relevant backpack CO_2 sprayers procedures

2.4. Storage

2.4.1. Due to size, tractor mounted spray equipment must be stored in the main equipment barn at Leyendecker Plant Science Research Center

3. For newly acquired equipment follow relevant maintenance SOPs

SOP: NMSU.50.03.00	*pg 1 of 3*
Title: Environmental monitoring devices	

Purpose: Informs on using environmental monitoring devices. Satisfies 40CFR160.63, & 40CFR160.81(b)(10), & (11).

Scope: Applies to all devices (thermometers, hygrothermometers, Kestrel or similar devices) used to monitor environmental conditions requiring GLP compliance for studies at the NMSU IR-4 research program.

Procedures:

1. Non GLP environmental monitoring devices

    1.1. Periodical data may be required for studies, such as irrigation records and daily weather records. This data may be acquired through meters or weather stations that are operated and maintained by the Experiment Stations. Consult with farm managers or research coordinators to determine availability and feasibility for studies

    1.2. Soil temperature, (if needed, soil moisture content), carrier temperature, & pH should be taken with non-GLP devices

2. GLP compliant environmental monitoring devices

    2.1. Kestrel (or similar devices)

        2.1.1. Replace Kestrel devices collecting environmental data during applications approximately biennially. Maintain any NIST documentation in the facility records

        2.2.2. Turn device on by pushing center circular button and allow time for acclimation to retrieve accurate readings. Pan right or left with arrows to view desired parameter.

        2.1.2. At or near desired boom height and facing wind direction, pan through screens for the desired measurement parameter including air temperature, wind speed, & relative humidity. Record ranges, averages, or single values as appropriate. If wind speed consistently exceeds 10 mph at the desired boom height, postpone application until wind speeds will not result in pesticide drift

        2.1.3. Store in a manner ensuring reliability and accurate readings, usually, in dry, contained spaces, protected from temperature extremes, humidity, and sunlight

    2.2. Thermometers

        2.2.1. Ensure all devices have unique identifiers (may be serial number)

        2.2.2. Traceable® Live thermometers – thermometers generally used in long-term storage facilities (test substance and sample storage freezers)

2.2.2.1. Submit MAC addresses to ACES-IT to allow IoT device to connect to the WiFi network. Follow necessary steps to connect device and ensure data transmission. If connectivity issues arise coordinate with ACES-IT

2.2.2.2. Replace, recalibrate or verify device accuracy and alarm function at or near when the device calibration is due to expire

2.2.2.2.1. If replaced, retain any NIST documentation in the facility records

2.2.2.2.2. If recalibrated, retain any NIST documentation in the facility records and additionally document this as routine maintenance

2.2.2.2.3. Verify device if use is to continue but calibration is near expiring

2.2.2.2.3.1. Compare probe data of a calibrated device with devices being verified for 3 temperatures (low, ambient, and high) allowing time for probes to acclimate (~1 – 2 hrs). If devices vary more than ± 3°C, replace or recalibrate the device being verified. For freezer devices, verify alarm at ambient or high points. For test substance devices, verify alarm at low and high points

2.2.2.2.3.2. Document verification as routine maintenance. This may be a table documenting the details of the calibrated device used for comparison along with the serial number, calibration expiry date, use location, test location, readings, reading variations from calibrated device, and if alarms notification passed

2.2.2.3. Download data as needed. Traceable®Live devices generally serve as backup data loggers and as alert notification. Primary data collection and entries may be obtained from min / max thermometers.

2.2.2.4. Data transmission may require frequent battery changes. This need not be recorded as routine maintenance

2.2.3. Min / max thermometers – main sources of data in long-term storage facilities, and used for monitoring sample and test transport and short-term storage

2.2.3.1. Record data in the appropriate log required for FDBs. Clear min / max memory after data is recorded

2.2.3.2. Follow relevant procedures for Traceable®Live devices to verify devices whose calibration is at or near expiration

2.2.3.3. Replace batteries as needed. This need not be routine maintenance.

2.3. Hygrothermometers

2.3.1. Greenhouse devices need not be GLP maintained, but to ensure accurate data, maintain one calibrated NIST device. Verify all hygrothermometer devices by comparing readings in at least 2 locations in the greenhouse. Humidity may vary by ± 10%, temperature by ± 3°Cs

SOP: NMSU.50.04.00	*pg 1 of 1*
Title: Freezers	

Purpose: Informs on using freezers used for storing samples. Satisfies 40CFR160.63, & 40CFR160.81(b)(10), & (11).

Scope: Applies to sample freezers used for GLP studies at the NMSU IR-4 research program.

Procedures:

1. Freezers should be set to maintain temperatures at or near -20°C to maintain sample integrity
2. Place freezers in a secured-entry location and limit freezer access to IR-4 personnel
3. Generally, maintain 2 freezers to allow separate storage of treated and untreated samples
4. All freezers will have unique identifiers
5. Follow relevant sample storage SOPs in 20.04
6. Maintain orderly freezers by cleaning or defrosting as needed

    6.1. This may be recorded as routine maintenance if unplugged or moved

7. Non-routine maintenance is maintenance to get a failed, non-working freezer back into working order. If this is not possible, replace the freezer

SOP: NMSU.50.05.00	*pg 1 of 1*
Title: Balances	

Purpose: Informs on using balances. Satisfies 40CFR160.63, & 40CFR160.81(b)(10), & (11).

Scope: Applies to balances used for GLP studies at the NMSU IR-4 research program.

Procedures:

1. GLP compliant balances – balances used to weigh test substances

    1.1. Give all balances and weight sets unique identifiers

    1.2. Maintain equipment logs following relevant equipment maintenance SOPs

    1.3. Ensure balance accuracy

        1.3.1. Calibrate or certify either the balance or weight sets approximately biennially with a reputable service

            1.3.1.1. Once one is calibrated / certified, use to certify the other. Record this in the facility files. (Ex01. If weights are sent for verification to an agency, within approximately one week of receiving the verified weights, test the balance to verify accuracy, record the stated weight value and the scale reading for each verified weight and retain in the facility files.; Ex02. If scale is calibrated or verified with an agency, within approximately one week, verify bracketing weights by recording the stated weight value and the scale reading for each weight tested and retain in the facility files.)

            1.3.1.2. If balance readings or weight set varies greater than ± 0.01g of tested weights, replace or recalibrate balance or weight sets to be in scope

    1.4. In the event of balance malfunction, a suitable replacement may be borrowed and used according to SOPs for weighing test substance

        1.4.1. Follow relevant borrowed equipment SOPs

        1.4.2. Replace balance at the earliest convenience with equipment dedicated to IR-4

    1.5. Clean equipment and store appropriately in a restricted access area

2. Non-GLP balances – balances used for weighing samples or other purposes

    2.1. Tare balance with empty container or bag

    2.2. Collect samples and weigh

    2.3. Clean and store balance as needed to maintain good working condition

    2.4. Repair or replace as needed, no maintenance logs are required

SOP: NMSU.50.06.00	*pg 1 of 1*
Title: Borrowed equipment	

Purpose: Informs on the use of borrowed equipment for trial activities. Satisfies 40CFR160.63, & 40CFR160.81(b)(10), & (11).

Scope: Applies to temporarily leased or borrowed equipment used for critical phases for GLP studies at the NMSU IR-4 research program.

Procedures:

1. IR-4 personnel are responsible for securing suitable temporary equipment to circumvent malfunctioning equipment or accomplish rarely occurring circumstantial tasks involved in a GLP study for which the purchase of new / used equipment is not feasible.

2. Once a suitable replacement is identified, test the equipment to ensure reasonable reliability and function for the intended task

   2.1. If adjustments are needed, document any adjustments made

   2.2. If cleaning is required, clean and document steps taken

   2.3. If calibrating, calibrate following relevant equipment, protocol, and SOP guidelines

3. Before equipment is returned, clean in a manner to prevent off target contamination risks

4. When using borrowed equipment, document at a minimum: 1) trials used for, 2) equipment description including serial numbers / makes / models, & and IR-4 personnel and date the following tasks were done:3) testing procedures, 4) cleaning procedures before and after use, 5) any calibrations and relevant data