

STANDARD OPERATING PROCEDURES FOR PREPARING FERTILIZER SAMPLES

SAMPLE PREPARATION SECTION

Revised: October 15, 2001

Revised June 26, 2002

INDEX

SOP 100	Riffling to Mix Dry Mixed Fertilizer (Single Bag)	1
SOP 100-A	Quartering to Mix Dry Mixed Fertilizer	3
SOP 101	Collecting Microscopic Sample & 32-Ounce Reserve Portion	4
SOP 102	Collecting An “Unground” Portion	6
SOP 103	Riffling To Collect 8-Ounce Analytical Sample (Single-Bag)	8
SOP 104	Riffling To Reduce Volume - Double Bag Sample	10
SOP 105	Preparing Time Released Fertilizer Spikes	12
SOP 106	Retsch ZM 100 Centrifugal Mill ((Pulverizer)	13
SOP 107	Screening A "Fine" Crushed Sample	15
SOP 108	Preparing "Seconds" For Deficient Samples	17
SOP 109	Preparing EPA Pesticide/Fertilizer Sample For The Pesticide Laboratory	19
SOP 110	Preparing Pelletized Dolomite	21
SOP 200	Preparing Analytical Portions Of Liming Material/Dolomite Sample	23
SOP 200-A	Quartering To Prepare Analytical Portion of Dolomite/Liming Material	24
SOP 201	Percent Moisture Test - Dolomite/Liming Material Sample	25
SOP 202	Screen Test For Dolomite/Liming Material - 1 st . Run	27
	Screen Test - Second Run	29
	Screen Test - Third Run and Fourth Run	30
	Screen Test Report Form	32
SOP 300	Liquid Fertilizer	33

OPERATION AND MAINTENANCE SECTION

Model DT-3000	34
Mikro-Samplmill	36
Dehumidifier Unit	39
Air Conditioner unit	41
SOP 106A Mikro-Samplmill (Pulverizer)	42

SOP 100: RIFFLING TO MIX DRY MIX FERTILIZER

SCOPE:

All dry mix fertilizer must be thoroughly mixed before it can be analyzed.

PRINCIPLE:

Mix a heterogeneous fertilizer sample composed of different size particles into a homogeneous mixture.

REAGENTS AND CHEMICALS:

None

APPARATUS AND EQUIPMENT:

Small and large riffle with cut-off gate accompanied by appropriate pans

Spatula with 12-inch blade

Glazed butcher's paper, approximately 24 inches by 36 inches

Shop vacuum with attachments or compressed air

Bottle brushes, large and small

Personal Protective Equipment:

Protective gloves

Safety goggles or safety glasses with side shields

Laboratory smock

Hearing protection if Mikro-Samplmill is in operation.

Model DT-3000 Down Draft Table or equivalent

RULES TO BE FOLLOWED WHEN RIFFLING:

When riffling, select appropriate size riffle to contain entire sample in the hopper.

With empty pans in position beneath riffle, pour entire sample into the center of the hopper forming an elongated cone.

Never pour a sample through an open gate.

After the entire sample has been riffled and the hopper is empty, leaving gate open, bump the riffle on the work surface several times to dislodge any trapped material.

When pouring riffled sample from a pan, always pour from the long side of the pan unless sides are longer than the riffle hopper.

When riffling a sample to reduce its volume, always save the same side each time. Always discard the same side each time.

After riffling is complete and sample is collected in appropriate containers, always clean riffle and pans with compressed air or vacuum system before introducing a new sample.

TO START THE RIFFLING PROCESS TO MIX SAMPLE TO UNIFORM MIXTURE:

Turn Down Draft unit on.

Select large or small riffle depending upon sample size.

Place pans in proper location under the selected riffle.

Remove sample and all bottles associated with sample from cart and place on down draft work surface.

Compare official number on sample bag to official number on bottles. (Make sure they are the same.) Determine if entire sample can be dumped in small rifle's hopper. If not, use large riffle to continue.

Open sealed bag and dump the entire sample into the riffle's hopper. With entire sample collected in the hopper, open the gate and allow material to flow freely in pans located beneath the riffle. (Wearing protective gloves, break up all lumps of fertilizer visible in hopper, trapped in riffle or collected in pans.)

After entire sample has been collected in both pans beneath riffle, with gate closed, empty each pan containing the sample back into the center portion of riffle's hopper pouring material into the hopper in a continuous flow. (Do not move the pan back and forth over the hopper; but form an elongated cone in the center of the hopper.) Place empty pans beneath riffle in correct position.

Open gate and allow material to flow into empty pans a second time mixing material to a uniform mixture. After hopper is empty, remember to bump riffle on work surface several times to help dislodge any trapped material. (If necessary, repeat a third time to mix sample.)

Go to SOP 101.

SOP 100A: QUARTERING TO MIX A DRY MIX FERTILIZER - COMMERCIAL BAG

If the sample is so large that the hopper of the large riffle will not contain all of the sample, it must be mixed on the table top and reduced in volume by quartering.

To mix a large volume sample:

Pour entire sample out on butcher paper and thoroughly mix it by rolling sample slowly from four directions (corners) of butcher paper. Use a large spatula to help mix the sample.

After the sample has been thoroughly mixed, roll the sample into a pile in the center of the paper.

Using a spatula, spread pile into a flat circle.

To reduce the volume of a large sample, it now must be “quartered”.

Using the large spatula, carefully split the sample into two equal halves; slowly separate each half. (Use small brush if necessary to sweep sample into appropriate half.)

Next, using the large spatula carefully split each half equally creating four quarters. Separate each quarter and if necessary use small brush again.

Using spatula and brush, discard opposite quarters by removing entire portions from butcher paper.

Recombine two remaining opposite quarters and thoroughly mix by rolling sample using four corners of butcher paper; use the large spatula it help mix.

Using spatula, spread sample into a flat circular pile and quarter following quartering techniques described above until opposite quarters can be contained in two large pans.

Carefully remove opposite quarters and collect in two large pans. (It may be necessary to “quarter” sample several times.)

Go to SOP 101.

SOP 101: COLLECTING A MICROSCOPIC SAMPLE AND 32-OUNCE RESERVE PORTION

SCOPE:

To collect a sample that accurately represents the original sample.

PRINCIPLE:

To retain approximately 1.0 ounce and 32 ounces of sample in appropriate container after sample has been thoroughly mixed.

REAGENTS:

None

APPARATUS AND EQUIPMENT:

Small riffle with cut-off gate accompanied by appropriate pans

Spatula with 12-inch blade

Glazed butcher's paper, 24 inches by 36 inches

Shop vacuum with attachments

Bottle brushes, large and small

Personal Protective Equipment:

Protective gloves (optional)

Safety goggles or safety glasses with side shields

Laboratory smock

Hearing protection if Mikro-Samplmill is in operation

1.0 ounce capacity scoop

Small zip-lock bag (labeled with official number)

32-ounce bottle with appropriate cap (labeled with official number)

Model DT-3000 Down Draft Unit

SAMPLE PREPARATION PROCEDURES:

After the sample has been mixed (SOP 100 or 100A), remove one pan from beneath small riffle collect the microscopic sample and the 32-ounce portion. (Leave the other pan in place.)

For the microscopic portion:

Remove the zip-locked bag from the 8-ounce bottle.

Holding the zip-lock bag open in one hand, scoop up approximately 1 ounce of sample by passing scoop along the top of the sample. (Use small scoop)

Pour scooped sample into zip-lock bag.
Seal bag and place in box starting at the front left corner.

For the 32-ounce reserve portion, using a funnel, carefully pour the entire contents of the pan into the 32-ounce bottle. (The sample should come up to the neck of the bottle.)
If contents of pan exceed the capacity of the 32-ounce bottle, the sample volume must be reduced by continued riffing.
When 32-ounce bottle is filled appropriately, place bottle on a laboratory cart to be stored in appropriate space on shelf.

Save pan containing “other” half of the riffled sample to continue sample preparation.
If the sample contains Water Insoluble Nitrogen (WIN) or is a custom blend containing pesticide or herbicide, go to SOP 102.
If sample does not contain any WIN or is not a custom blend, go to SOP 103

SOP 102: COLLECTING AN “UNGROUND” PORTION: Water Insoluble Nitrogen & Fertilizer Containing Pesticide (Custom Blend)

SCOPE:

To collect an “Unground” portion of a sample that contains water insoluble nitrogen or contains pesticide or herbicide to be analyzed in the Pesticide Laboratory.

PRINCIPLE:

To reduce the volume of sample from the field while maintaining the integrity of the sample.

REAGENTS:

None

APPARATUS AND EQUIPMENT:

Small riffle with cut-off gate accompanied by appropriate pans

Spatula with 12-inch blade

Glazed butcher's paper, 24 inches by 36 inches

Shop vacuum with attachments or compressed air

Bottle brushes, large and small

Personal Protective Equipment:

Protective gloves (optional)

Safety goggles or safety glasses with side shields

Laboratory smock

Hearing protection if Mikro-Samplmill is in operation.

Proper labeled containers of appropriate size.

Plastic funnel

Model DT-3000 Down Draft Unit

SAMPLE PREPARATION PROCEDURES:

SOP 100 & 101 have been completed; the sample has been mixed, the microscopic and 32-ounce reserve portions collected. With the down draft unit turned on:

To Collect Unground Portion:

Follow riffing techniques described in SOP 100.

Using “other” half of original sample from SOP 101.

Without discarding any sample, continue to riffle the sample to reduce volume of one pan until slightly less than 16 ounces remain in that pan.

Place plastic funnel in container marked "Unground" (16-ounce bottle).

Pour the approximate 16-ounce sample into container marked "Unground".

Cap sample and place on laboratory cart in appropriate place (to be placed on shelf.)

Place empty pan under riffle with "saved" portion.

If sample contained pesticide/herbicide **and** was a "Custom Blend," an additional "Unground" portion, (as well as an additional analytical portion) is required for the Pesticide Laboratory.

Repeat steps 1 & 2 above preparing another "Unground" portion for the Pesticide Laboratory.

Retain this sample until the "Ground" analytical portion is completed following SOP 103.

Hold both samples in Sample Preparation area until a request is made to transfer them to the Pesticide Laboratory.

Continue sample preparation using the saved portion, which is under the riffle, and going to SOP 103.

SOP 103: RIFFLING TO COLLECT 8-OUNCE ANALYTICAL SAMPLE - SINGLE BAG

SCOPE:

To convert a sample received from the field into a size that can be managed in the laboratory.

PRINCIPLE:

To reduce the volume of sample received from the field to an amount that can be analyzed in the laboratory.

CHEMICAL AND REAGENTS:

None

APPARATUS AND EQUIPMENT:

Small riffle with cut-off gate accompanied by appropriate pans

Spatula with 12-inch blade

Glazed butcher's paper, 24 inches by 36 inches

Shop vacuum with attachments or compressed air

Bottle brushes, large and small

Personal Protective Equipment:

Protective gloves (optional)

Safety goggles or safety glasses with side shields

Laboratory smock

Hearing protection if Mikro-Samplmill is in operation.

Waste container to hold discarded fertilizer sample

8-ounce bottle with appropriate cap

Plastic funnel

Model DT-3000 Down Draft Unit

SAMPLE PREPARATION PROCEDURE

With Down Draft unit on, thoroughly mix sample following SOP 100.

Draw microscopic sample by following SOP 101.

If sample contains a guaranteed slow-release ingredient, follow SOP 102.

If sample is a custom blend sample (as described in SP 004), an additional 8 ounce analytical portion must be prepared for the Pesticide Laboratory.

TO COLLECT 8 OUNCE ANALYTICAL BOTTLE

Place one empty pan beneath the small riffle.

Using “saved” portion from SOP 102, pour saved sample into hopper of small riffle. Place empty pan in appropriate position beneath riffle and riffle sample following riffing techniques described in SOP 100 - 102 reducing volume until 8-ounce bottle is filled about half full from sample remaining in one pan.

Discard one pan of sample into designated waste container unless sample must be saved for an additional 8-ounce analytical portion.

Return the empty pan to proper position beneath riffle.

Riffle remaining sample riffing same side each time reducing sample volume on opposite side until an 8 ounce bottle can be filled about ½ full.

Using plastic funnel, carefully pour reduced portion into 8-ounce bottle. Remove funnel and place uncapped bottle in designated location.

Use a vacuum cleaner or compressed air, clean both pans and riffle paying particular attention to the partition portion of the riffle.

After cleaning, return empty pans to proper position under the riffle for next sample.

SOP 104: RIFFLING TO REDUCE VOLUME - DOUBLE BAG SAMPLE

SCOPE:

To convert a sample received from the field into a size that can be managed in the laboratory.

PRINCIPLE:

To reduce the volume of sample received from the field to an amount that can be analyzed in the laboratory.

CHEMICALS AND REAGENTS:

None

APPARATUS AND EQUIPMENT:

Small and large riffle with cut-off gate accompanied by appropriate pans
Spatula with 12-inch blade
Glazed butcher's paper, 24 inches by 36 inches
Shop vacuum with attachments
Cleaning brushes

Personal Protective Equipment:

Protective gloves (optional)
Safety goggles or safety glasses with side shields
Laboratory smock
Ear protection if Mikro-Samplmill is in operation

Two 8-ounce bottles with red labels marked "ground" and "unground"
Plastic funnel
Model DT-3000 Down Draft Unit

SAMPLE PREPARATION PROCEDURES:

For a "double" sample, the large size riffle must be used to process entire sample.

Pour both bags of fertilizer into hopper of large riffle forming cone.

Mix sample following SOP 100.

After sample has been mixed, collect the microscopic sample and 32-ounce reserve portion by reducing the volume of one side and saving the opposite side. (SOP 101)

From the saved portion, follow SOP 102 if an "Unground" portion is required.

From saved portion, place empty pan under riffle and riffle sample into equal halves.

Discard one pan of sample into appropriate waste container.

From saved portion, use small riffle and follow SOP 103 to collect an 8-ounce analytical sample.

Follow SOP 104 if Pesticide Laboratory requires a non-EPA pesticide/fertilizer sample. (refer to SOP 004)

SOP 105: TIME-RELEASED FERTILIZER SPIKES

SCOPE:

Convert solid fertilizer brick into smaller size that can be analyzed in the laboratory.

PRINCIPLE:

Fertilizer spike sample is crushed to a consistency that allows the material to be prepared as a dry mix fertilizer.

APPARATUS AND EQUIPMENT:

Clean plastic sample bag (3 mil.)
Hammer or maul of sufficient size to crush spike
Stick-on label
32-ounce bottle with cap
8-ounce bottle with cap
Small zip lock bag 3" x 4" x .002 mil

Personnel Protective Equipment:

Goggles or safety glasses with side shields
Protective gloves
Laboratory smock
Ear protection if Mikro-Samplmill is in operation

SAMPLE PREPARATION PROCEDURES:

Place spike in clean plastic sample bag and seal by twisting.

Holding twisted portion, strike spike with hammer/maul with sufficient force to crush it until it resembles coarse sand.

Pour crushed portion into small riffle; continue until all spikes have been crushed and collected in riffle. (Replace bag as needed)

Prepare crushed sample material following SOP 100 - 103.

SOP 106: PULVERIZING A SAMPLE USING RETSCH ZM 100 UNTRA CENTRIFUGAL MILL

SCOPE:

To convert a granulated material into a powder of uniform consistency.

PRINCIPLE:

A granular fertilizer sample is pulverized to the degree that particles are reduced to a size that will pass through a standard size screen.

APPARATUS AND EQUIPMENT:

Retsch ZM 100 equipped with 4.0 mm and 6.0 mm ring sieves
Wire brass brush - wooden handle
Large bottle brush
Small, medium and large riffle with cut-off gate accompanied by appropriate pans
Glazed butcher's paper, 24 inches by 36 inches
Shop vacuum with attachments
Sieve as described in SOP 107

Personal Protective Equipment:
Protective gloves (optional)
Safety goggles or safety glasses with side shields
Laboratory smock
Ear protection

Model DT-3000 Down Draft Unit

SAMPLE PREPARATION PROCEDURES:

At the beginning of each work period, activate power to mill (impossible to open mill cover without power on) by pressing on/off switch located under front left corner of mill. When power is on:

Function light glows green after short period of self testing
Speed indicator glows green
Stop button glows red

Pull lower portion of manual sealing latch outward and open housing cover.
Remove cassette cover. Remove and inspect ring sieve, rotor and collecting vessel for cleanliness. (Collecting vessel must be raised or removed to reset magnetic safety device.)

After inspection is complete:
Insert collection vessel in proper location
Place clean rotor in appropriate position

Insert appropriate ring sieve (arrow on sieve must point to the right)
Mount cassette cover over collecting vessel

Close mill housing and lock with pretension manual seal latch. (Function light will light green)

TO PULVERIZE A SAMPLE

Select appropriate speed (1400 or 1800 rpm)

Press START button and allow mill to come to speed.

Slowly introduce 8-ounce sample into mill through feed funnel.

Observe load control indicator on front of mill.

Green range 0 - 10: Motor is operating under optimum conditions.

Yellow range 11-13: Motor operating slightly above rated power range but is okay for a short period of time.

Red range 14 -16: Motor is operating beyond rated power rating. Stop introducing material and allow motor to regain appropriate rpm's.

After the entire sample has been introduced into the mill and grinding is complete, as indicated by the load control indicator, press the STOP button. (Function light turns red)

When function light turns green, the operator can release manual seal latch and open unit cover.

Remove cassette cover. Using large bottle brush, clean fertilizer from beneath cover onto clean glazed butcher paper. (When clean, place to one side)

Remove ring sieve and clean, collecting pulverized material onto butcher paper. (Place clean sieve to one side)

Remove rotor and clean with bottle brush, collecting all pulverized fertilizer on butcher paper. (Place to one side when clean)

Remove collecting vessel and dump contents onto butcher paper. Clean remaining residue from collecting vessel using large brush. (When clean, place to one side)

Using large spatula, thoroughly mix pulverized sample by mixing and rolling sample at least three times.

Using clean plastic funnel, pour mixed pulverized sample in 8-ounce container.

Final inspection and cleaning - using appropriate brush and compressed air, clean and inspect the cassette cover, ring sieve, rotor, collecting vessel and butcher paper. After final cleaning process is complete, place in appropriate position for next sample.

SOP 107: SCREENING A CRUSHED SAMPLE

SCOPE:

To determine that the entire sample of granulated fertilizer has been crushed to a size that it will pass through a fine mesh screen of specific screen size.

PRINCIPLE:

A "ground" or finely crushed sample of mixed fertilizer is filtered through a specific screen size to determine that the entire sample has been "sized."

REAGENTS AND CHEMICALS:

None

APPARATUS AND EQUIPMENT:

Sieve, Tyler equivalent twenty four (24) mesh, Sieve No. 25, opening micrometer seven hundred ten (710) or opening in inches of .278 inches for "First."

Sieve, Tyler equivalent thirty five (35) mesh, Sieve No. 40, opening micrometer 425, and opening in inches of .0165 inches for "Seconds."

Plastic funnel

Spatula with 12-inch blade

Glazed butcher's paper, 24 inches by 36 inches

Shop vacuum with attachments

Cleaning brushes

Personal Protective Equipment:

Protective gloves (optional)

Safety goggles or safety glasses with side shields

Laboratory smock

Ear protection if Mikro-Samplmill is in operation.

8-ounce sample bottle

SAMPLE PREPARATION PROCEDURES:

Work area set-up:

Place a clean sheet of white poly-laminated paper approximately 24 inches by 36 inches on the work surface.

Position a clean sieve (No. 25 Tyler Screen) in center of poly-laminated paper.

Set the empty-8 ounce sample bottle to one side.

Dump the finely crushed sample (from ZM 100 or Mikro-Samplmill) into the center of the sieve. (Use large bottle brush to remove all of sample from plastic pan)

Pick up the sieve containing the sample in one hand and empty 8-ounce bottle in the other hand. While moving sieve in small circular motions over the center of the white paper, use 8-ounce bottle as pestle; without making circular motions with bottle, keep it in contact with the sample to help move sample through screen.

Continue above motion until all of the sample has passed through sieve and is collected on poly-laminated paper.

Re-crush all of sample that will not pass through sieve by using mortar and pestle.

After all of sample has passed through the screen:

Holding sieve over screened sample, clean both sides of sieve using a large bottle brush.

After the sieve is clean, place it to one side of poly-laminated paper.

Using the large spatula, thoroughly mix the sample by rolling it on paper three times. To "roll" a sample:

With left hand, pick up left side of paper about 6 inches.

With 12-inch spatula in right hand, move sample towards left side of paper

With left hand holding edge of paper, bring left side of paper across the sample in such a way that the sample is trapped in the "fold" and rolled along.

Open paper and with spatula mix and move sample to left side of paper again.

Roll sample at least two more times.

After sample is mixed thoroughly, lay paper containing sample flat on the work surface. Place plastic funnel in mouth of 8-ounce sample bottle.

Using both hands, pick up each side of paper and fold together trapping the sample in folded portion of paper.

Holding one end of folded paper over plastic funnel, carefully pour sample into 8-ounce container. (Use fingers to hold funnel in place)

Lay paper to one side taking care not to disturb bottle/funnel.

Remove funnel and seal analytical portion (8-ounce bottle) with cap or stopper.

Roll bottle in palm of hand several times.

Place in numerical order in designated area.

Position paper on work surface. Clean paper and spatula by wiping surfaces with large bottle brush. (Place spatula to one side of paper after it's clean)

Place clean sieve in center of paper for next sample.

SP 108: PREPARING "SECONDS" OR DEFICIENT SAMPLE

SCOPE:

To determine if the analytical analysis of a fertilizer sample is accurate and repeatable.

PRINCIPLE:

To prepare a second fertilizer sample after the first analysis indicates that it is deficient.

CHEMICALS AND REAGENTS:

None

APPARATUS AND EQUIPMENT:

ZM 100 Mill with 4.0 mm ring sieve or Mikro-Samplmill and a No. 3465, .032 RD, PE, 24 Gauge 304 Screen

Sieve, Tyler equivalent thirty five (35) mesh, Sieve No. 40, opening micrometer 425, and opening in inches of .0165 inches for "Seconds."

8-ounce bottle

Plastic funnel

Spatula with 12-inch blade

Glazed butcher's paper, 24 inches by 36 inches

Shop vacuum with attachments

Large and small bottle brushes

Personal Protective Equipment:

Protective gloves (optional)

Safety goggles or safety glasses with side shields

Laboratory smock

Hearing protection

Down Draft Unit

SAMPLE PREPARATION PROCEDURES:

Using "Seconds" list as reference, remove 32-ounce "Reserve" bottle from storage shelf and place on a laboratory cart:

Place a check mark next to number on "seconds" list to indicate that a "second" will be prepared.

Place a clean 8-ounce unlabeled bottle next to the 32-ounce reserve portion.

After all samples on the list have been pulled, save list by returning it to its proper location.

With a red ball point pen, identify "Seconds" sample by writing the following information on a new stick-on label and attaching it to unlabeled 8-ounce bottle:

Official number of 32-ounce bottle

Write 2nd above official number to identify the sample as a "second."

Write initials on bottom of label

On the label of the 32-ounce bottle, write 2nd across the top portion of the label to indicate that a second has been prepared.

Riffle contents of 32 ounce "Reserve Portion" following SOP 100 and 103.

Reduce the same side each time until volume of one pan can be placed in the 8- ounce bottle.

The volume of second the pan is returned to 32-ounce bottle and retained in storage.

Follow SOP 106 with the following exceptions.

For ZM 100 Mill use 4.0 ring sieve

For Mikro-Samplmill, install .032 inch screen.

Use No. 40 sieve to screen pulverized sample.

After the 2nd is prepared:

Return the 32-ounce bottle to proper position on shelf.

Place "2nd" sample on shelf directly above the original 8-ounce sample.

SOP 109: PREPARING AN EPA PESTICIDE/FERTILIZER SAMPLE FOR THE PESTICIDE LABORATORY

SCOPE:

An EPA chain-of-custody fertilizer/pesticide sample is received by, and must remain in the custody of the Pesticide Laboratory at all times. Its chain-of-custody seal is broken by Pesticide Laboratory personnel only.

Fertilizer Laboratory personnel will prepare chain-of-custody samples under the directions and observation of Pesticide laboratory personnel.

PRINCIPLE:

Prepare the sample under directions of Pesticide Laboratory Sample Custodian.

REAGENTS AND CHEMICALS:

None

APPARATUS AND EQUIPMENT:

ZM 100 Mill containing appropriate ring sieve or Mikro-Samplmill equipped with No. 3481, .020 RD, PE, 24 Gauge 304 Screen

Wire brass brush - wooden handle

Large and small bottle brush

Scraper or knife

Small and large riffle with cut-off gate accompanied by appropriate pans

Glazed butcher's paper, 24 inches by 36 inches

Shop vacuum with attachments

Sieve as described in SOP 107

Personal Protective Equipment:

Protective gloves

Safety goggles or safety glasses with side shields

Laboratory smock

Ear protection

Model DT-3000 Down Draft Unit

SAMPLE PREPARATION PROCEDURES:

Pesticide Laboratory Sample Custodian shall:

Remove and separate pesticide report from the fertilizer report.

Retain the pesticide report.

Place the fertilizer report and tags in custody of Fertilizer Laboratory personnel.
Break the chain-of-custody seal and remove the bucket containing sample from its plastic bag.
Places bucket containing the sample on cart with appropriate bottles.

Fertilizer Laboratory personnel, under direct observation and direction of the Pesticide Laboratory Sample Custodian, shall:

Open sample bucket and follow SOP's 100, 102, 103 and 105 to prepare an "Unground" and "Ground" portion for the Pesticide Laboratory. (Save all remaining sample)

As sample preparation is completed for each portion, that portion is placed in the custody of the Pesticide Laboratory sample custodian present.

Return all "saved" sample to the original plastic bucket.

Place lid on plastic bucket and seal.

Reunite the fertilizer sample with the fertilizer report.

Record date on bucket when sample was received as a **fertilizer** sample.

Place sample and fertilizer report on the receiving table to be written in as a **fertilizer** sample.

After sample is written in, start at SOP 100 and prepare sample as a fertilizer.

SOP 110: PELLETIZED DOLOMITE - LIMESTONE SAMPLE

On “label” and “tag”, it must state that sample is “Pelletized”. If this is not stated, treat sample as regular dolomite/limestone sample.

SCOPE:

Mix and reduce volume of pelletized dolomite sample to a uniform consistency.

PRINCIPLE:

Provide a representative sample for laboratory analysis.

REAGENTS AND CHEMICALS:

None

APPARATUS AND EQUIPMENT:

ZM 100 Mill with 4.0 or 6.0 mm ring sieve

Mikro-Samplmill equipped with:

No. 3465, .032 RD, PE, 24 Gauge 304 Screen

No. 3481, .020 RD, PE, 24 Gauge 304 Screen

Wire brass brush - wooden handle

Large and small bottle brush

Scraper or knife

Small and large riffle with cut-off gate accompanied by appropriate pans

Glazed butcher's paper, 24 inches by 36 inches

Shop vacuum with attachments

Sieve as described in SOP 107

Personal Protective Equipment:

Protective gloves (optional)

Safety goggles or safety glasses with side shields

Laboratory smock

Ear protection

Model DT-3000 Down Draft Unit

SAMPLE PREPARATION PROCEDURES:

Label containers as follows:

On the 32-ounce bottle: date and official number. On bottom of label write “pelletized dolomite”.

On the 8-ounce bottle: official number only (analytical portion)

On the 8-ounce bottle: date and official number. Across bottom portion of the label, write "Moisture Only".

On zip-locked bag: official number only

Follow SOP's 100, 101, 103, 106, 107, 108, 111 and 112

SOP 200: PREPARING ANALYTICAL PORTIONS OF LIMING MATERIAL OR DOLOMITE SAMPLE

SCOPE:

Mix and reduce liming material (dolomite) sample to an appropriate volume for laboratory analysis.

PRINCIPLE:

Convert a field sample to an analytical sample by mixing and reducing sample volume.

REAGENTS AND CHEMICALS:

None

APPARATUS AND EQUIPMENT:

One 32-ounce bottle with cap
Two 8-ounce bottles with caps
Plastic funnel

Personal Protective Equipment:

Laboratory smock
Safety goggles or safety glasses with side shields
Protective gloves
Ear protection if ZM 100 or Mikro-Samplmill are operating close by

SAMPLE PREPARATION PROCEDURES:

Prepare two 8-ounce bottles and one 32-ounce bottle with accompanying labels as follows:(SP 011)

One stick-on label for 32-ounce bottle: official number, date and “Dolomite”.
One stick-on label for one 8-ounce bottle: official number, date, and “Screen Test”.
One stick-on label for other 8-ounce bottle: official number only

Remove caps and place 32-ounce bottle and both 8-ounce bottles in large riffle pan.

Open bag containing sample and pour material from bag into each bottle. Fill all bottles full.

Cap bottles and remove from pan, cleaning excess sample from bottles.

Retain bottles as:

32-ounce reserve portion on shelf in numerical order
8-ounce bottles to dolomite/liming material testing area
Discard remainder of sample into fertilizer waste containers.

SOP 200A: PREPARING ANALYTICAL PORTIONS OF LIMING MATERIAL OR DOLOMITE BY QUARTERING

SCOPE:

Mix and reduce volume of dolomite sample to a uniform consistency.

PRINCIPLE:

Provide a representative sample for laboratory analysis.

REAGENTS AND CHEMICALS:

None

APPARATUS AND EQUIPMENT:

Same as SOP 110 with the following additions:

Large riffle pan

Glazed butcher's paper, 24 inches by thirty six (36) inches

Spatula with 12-inch blade

SAMPLE PREPARATION PROCEDURES:

Prepare stick-on labels with the information as described in SOP 110.

Dump sample onto laminated paper and allow to dry.

After sample has dried, mix sample thoroughly by rolling sample on paper using large spatula.

Create "Cone" in center of paper.

Using large spatula, cut cone in half, carefully separating both halves by about 1/4 of an inch.

Again, using spatula, dissect both halves equally (creating quarters) and carefully separate each quarter by about 1/4 of an inch.

Carefully remove opposite quarters and discard into waste container. (Cardboard box)

Combine and mix thoroughly two opposite quarters, forming "cone" in the center of paper.

Repeat steps 4 and 5 above to quarter sample again.

Collect and place opposite quarters into a 32-ounce bottle and retain as the "Reserve Portion."

Mix and cone the two remaining opposite quarters following steps 4 and 5 above until each opposite quarter can be placed in separate 8-ounce bottles.

One 8-ounce bottle to Fertilizer Laboratory

Retain 8-ounce bottle labeled "Screen Test"

32-ounce Reserve portion retained on storage shelf

SOP 201: PERCENT MOISTURE TEST - DOLOMITE/LIMING MATERIAL

SCOPE:

To determine the % moisture of a sample.

PRINCIPLE:

Moist sample is weighed, heated to a constant temperature for a period of time to “drive” moisture from material. Sample is then re-weighed to determine amount of moisture lost.

REGENTS AND CHEMICALS:

None

APPARATUS AND EQUIPMENT:

Mettler balance having 9-inch diameter weighing pan with spout
4-inch diameter aluminum pan, 1-inch deep (large pan)
2 ½-inch aluminum pan ½-inch deep (small pan)
Paper tab, about 1-inch square for "Official Number"
Spatula with 4-inch blade
Screen Test/Moisture Test Report Form

Personal Protective Material
Laboratory smock
Safety goggles or safety glasses with side shields
Hearing protection if ZM 100 or Mikro-Samplmill are operating close by

SAMPLE PREPARATION PROCEDURE:

After zeroing Mettler balance, weigh 4-inch diameter aluminum pan.
Record weight of empty pan and "Official Number" of sample to be analyzed on 1-inch square paper tab. Lay to one side.
Into 4-inch metal pan, using spatula, weigh out **exactly** 100.0 grams of sample to be analyzed (wt. of empty pan plus 100.0 grams of sample).
Record total weigh of sample and pan on Screen Test Report - % Moisture section (with red pen) in space provided.
Place paper tab identifying sample in pan with sample.
Add generous amount of wet sample to smaller 2 ½-inch diameter pan. (Reserve portion that is not weighed.)
Place both pans (including paper tab) in oven heated to 106 degrees centigrade.
Dry both samples for not less than 4 hours before removing from oven.
Remove sample and reserve portion from oven after at least 4 hours and place in dessicator to cool or until next step can be preformed.

Remove dried sample and reserve portion from dessicator.

Remove paper tab from sample being careful not to remove any sample; re-weigh 4 inch diameter pan containing the dried sample.

Record weight (in red) on the Screen Test Report - % Moisture section in space provided.

Place paper tab information back in sample pan and **retain** along with the reserve portion for Screen Test (SOP 112). (Retain sample and reserve portion in dessicator if not going immediately to SOP 112)

Subtract total dry weight from total wet and record difference (in red) on **bottom line** of the Screen Test in the percent (%) moisture section.

SOP 202: SCREEN TEST FOR DOLOMITE/LIMING MATERIALS - 1ST. RUN

SCOPE:

To determine particle size of **dried** dolomite or liming material

PRINCIPLE:

100.0 grams of dry material is passed through a series of sieves to determine particle size.

REAGENTS AND CHEMICALS:

None

APPARATUS AND EQUIPMENT:

Mettler balance having 9-inch diameter weighing pan with spout

4-inch diameter pan, 1-inch deep (large pan)

2 1/2-inch pan, 1/2-inch deep (small pan)

Paper tab, about 1-inch square for writing official number

Spatula with 4-inch blade

Laboratory oven set at 106 degrees centigrade

Brass wire brush with wooden handle

Camel hair brush (small)

Ro-Tap Sieve Shaker for 8-inch diameter sieve

U.S. Standard sieve No. 8 or Tyler Equivalent 8 mesh

U.S. Standard sieve No. 20 or Tyler Equivalent 20 mesh

U.S. Standard sieve No. 50 or Tyler Equivalent 48 mesh

U.S. Standard separator pan (stack catch pan)

U.S. Standard receiver pan (bottom catch pan)

U.S. Standard sieve cover

Screen Test/Moisture Test Report Form

Personal Protective Equipment: Same as SOP 111

SAMPLE PREPARATION PROCEDURES:

Remove dried sample and reserve portion from dessicator after SOP 111 is complete. If the sample has not been dried, follow SOP 111 to dry sample out.

Zero Mettler balance.

Place 4-inch diameter pan containing the dry sample from SOP 111 on Mettler balance and re-weigh sample. (Weight should not have changed from SOP 111.)

From the reserve portion, using a spatula, add an additional amount of sample until weight of sample in 4-inch pan equals 100.0 grams.

Organize empty sieves: 8 mesh on top followed by 20 mesh, then 50 mesh, then receiver pan or catch pan on bottom. (Largest opening on top followed by smaller openings.)

After sieves are stacked along with catch pan, dump 100.0 grams of dry sample onto the center portion of the No. 8 sieve.

Use camel hair brush to remove all of sample from 4-inch pan into 8 mesh screen.

Cover stacked sieves with lid.

Place entire stack on Ro-Tap; set Ro-Tap timer for 20 minutes.

After Ro-Tap is complete, remove the entire stack from Ro-Tap and place on counter next to Mettler balance.

Place clean 9-inch weighing pan on Mettler balance, zero balance to include weight of weighing pan.

Dump sample from No. 8 sieve into weighing pan; use brass wire brush to remove all of sample from sieve.

Record weight (in red) on Screen Test Report Sheet under "1ST. Run, +8 M."

Dump contents of 9-inch weighing pan into 4-inch pan. Use camel hair brush to remove all of the sample from weighing pan to smaller pan.

Save this portion of sample for 2nd run if 1st run is deficient.

Save by placing 4-inch pan containing the saved portion in original sieve until it is determined that sample has passed Screen Test.

Return 9-inch weighing pan to Mettler balance and zero balance again.

Dump sample from No. 20 sieve into 9-inch weighing pan; use brass wire brush to remove all of sample.

Record weight (in red) on Screen Test Report Sheet under "1st Run +20 M."

Dump contents of 9-inch weighing pan into a second 4-inch pan. (Again, use camel hair brush to remove all of sample from the weighing pan to smaller pan.)

Save this portion of sample for 2nd run if 1st run is deficient.

Save by placing 4-inch pan containing the saved portion in original sieve until it is determined that sample has passed Screen Test.

Return 9-inch weighing pan to Mettler balance and repeat zero balance.

Dump sample from No. 50 sieve into the 9-inch weighing pan; use brass wire brush to remove all of sample.

Record weight (in red) on Screen Test Report Sheet under "1st Run, +50 M."

Dump contents from weighing pan into a third 4-inch diameter pan and save. (Again, use camel hair brush to remove all of sample from weighing pan into the smaller pan.)

Save this portion in 4-inch pan for 2nd run if 1st run is deficient.

Save by placing 4-inch pan containing saved portion in its original sieve until it has been determined that the sample has passed the Screen Test.

To determine if sample has passed the Screen Test, the following criteria must be met:

Percent passing No. 8 mesh sieve not less than 90% (+ 8 M must be less than 10)

Percent passing No. 20 mesh sieve not less than 80% (-20 M must be greater than or equal to 80)

Percent passing No. 50 mesh sieve not less than 50% (-50 M must be greater than or equal to 50)

To do determinations (calculations):

To pass, +8 M % must be **less than** 10% to pass.

To determine -20 M, add +8 M and +20 M, then subtract that sum from 100.0. The difference = -20 M. To determine -50 M, subtract +50 M from -20 M. The difference = -50 M.

In summary:

- (1) +8 M must be less than 10% to pass.
- (2) -20 M must be greater than or equal to 80% to pass.
- (3) -50 M must be greater than or equal to 50% to pass.

If all criteria are met for 1st Run, the analysis is complete; submit the report to the Fertilizer Laboratory.

The saved portions of the sample are discarded.

If any part of sieve test fails, a second screen test is performed. (Screen Test 2nd Run)

SCREEN TEST: 2nd RUN

A second screen test is necessary when criteria set forth in 1st Run are not met.

Using saved portions from the 1st run, pour each 4-inch diameter saved portion of sample back into its original sieves.

Re-stack sieves containing saved portion in same order as 1st Run.

Wash re-stacked sieves in sink under water faucet until discharge from sieves is clear.

Place stacked sieves into oven set at 106 degrees C for 30 minutes.

With 9-inch weighing pan on Mettler balance, zero balance to include weight of weighing pan.

Dump sample from No. 8 sieve into weighing pan; use brass wire brush to remove all of sample.

Record weight (blue or black pen) of Screen Test Report Sheet under "2nd Run, +8 M."

Discard sample into plastic waste container using camel hair brush to remove all of sample from 9-inch weighing pan.

Return 9-inch weighing pan to Mettler balance and zero balance.

Dump sample from No. 20 sieve into weighing pan; use brass wire brush to remove all of sample.

Record weight (blue or black pen) on Screen Test Report Sheet under "2nd Run, +20 M."

Discard sample in plastic waste container using camel hair brush to remove all of sample from the weighing pan.

Return 9-inch weighing pan to Mettler balance and zero balance.

Dump sample from No. 50 sieve into weighing pan; use brass wire brush to remove all of sample.

Record weight (blue or black pen) on Screen Test Report Sheet under "2nd Run, +50 M."

Discard sample in plastic waste container using camel hair brush to remove all of sample from the weighing pan.

Determine if sample passed 2nd Run screen test using same criteria as 1st Run. If all criteria are met, the sample passed and the report can be submitted to Fertilizer Laboratory.

If criteria were not met and the sample failed the 2nd Run, discard all of previously tested sample and prepare a new sample for the 3rd and 4th Run.

SCREEN TEST: 3rd RUN & 4th RUN

For the 3rd and 4th Run, two separate sets, labeled “3” and “4” are required. Each set is made up of one 4-inch aluminum pan and one 2 1/2-inch aluminum pan for a reserve portion.

In addition, another **Percent Moisture Test** must be completed on both sets of samples.

Using "Official Number," for reference, pull 32-ounce "Reserve Bottle" from "Reserve Storage.

Zero the Mettler balance making sure the weighted flat pan is in place.

Label two separate 1-inch square pieces of paper “3” and “4”. Record official number of sample on each square of paper.

Separately, weigh out 100.0 grams of moist sample from the "Reserve Bottle" into each 4- inch diameter pan.

Add generous amount of moist sample to smaller 2 1/2-inch diameter pan and place next to 4- inch pan. (Reserve Portion)

For % Moisture Test 3rd and 4th Run:

Record total weight of "3rd run" sample and pan on Screen Test Report - % Moisture Section (red pen) in space between "Wet plus pan and dry Plus pan" of the "1ST Run". (Place paper tab back in sample pan to identify sample.)

Record total weight of "4th. Run" (black pen) on "Wet plus pan" line far right. (Place paper tab back in sample pan to identify sample.)

Place both sets of pans (including paper tab) in oven heated to 106 degrees centigrade.

Dry both sets of sample and reserve portion for not less than 4 hours before removing from oven.

Remove both sets of samples from oven and re-weigh each 4-inch sample. (Do not weigh paper tab.)

To continue % Moisture Test 3rd and 4th Run:

Record 3rd run dry weight (in red) in space below results of 1ST. Run but **not** on empty line.

Record 4th Run (black pen) on "dry Plus pan" line far right.

Determine % Moisture by subtracting dry weight from wet weight.

After % Moisture Test is complete, using spatula, bring weight of dried 4-inch samples #3 and #4 to 100.0 grams by adding dried reserve portion from corresponding small pan. (Sit to one side)

Record total weight of dried sample (100.0 grams) and pan on corresponding 1-inch tab. Place both sets to one side.

Stack two sets of sieves with standard sieve No. 8 on top, standard sieve No. 20 in middle and standard sieve No. 50 on bottom.

Separately, dump sample from 4-inch pan onto stacked screens using camel hair brush to remove all of sample.

Wash each stack until water appears clear, then separate the screens and wash each individual screen until water appears clear. (Keep screens in order of stack set)

Re-stack screen set and return both stacks (including paper tab) to oven heated to 106 degrees centigrade. Dry sample for 30 minutes.

Remove both stacks from oven and place on counter next to Mettler balance. With 9-inch weighing pan on Mettler balance, zero balance to include weight of weighing pan. From one stack, dump sample from No. 8 sieve into weighing pan. Use the brass wire brush to remove all of sample.

Record weight (red pen) on Screen Test Report Sheet under 3rd Run, on + 8 M line.

Discard contents of weighing pan using camel hair brush to remove all sample

From same stack, dump sample from No. 20 sieve into weighing pan. (Use wire brush to remove all of sample)

Record weight (red pen) on Screen Test Report Sheet under 3rd Run, on + 20 M line.

Discard contents of weighing pan using camel hair brush to clean pan.

From same stack, dump sample from No. 50 sieve into weighing pan using wire brush to remove all sample.

Record weight (red pen) on Screen Test Report Sheet under 3rd Run, on + 50 M line.

Discard contents of weighing pan using camel hair brush to clean pan.

Zero balance with weighing pan in place, repeat steps 16 through 24.

Record weights (black pen) on Screen Test Report Sheet under 4th Run, on + 8, + 20, and + 50 M lines.

Do necessary determinations:

To pass +8 M, % must be a number that is less than 10%.

To determine -20 M, add +8M and +20 M, then subtract that sum from 100.0 which is equal to -20 M.

To determine -50 M, subtract +50 M from -20 M. The resulting sum is -50 M.

In summary:

+8 M must be less than 10% to pass.

-20 M must be greater than or equal to 80%.

-50 M must be greater than or equal to 50%.

SOP 300: LIQUID FERTILIZER

SCOPE:

Organize liquid fertilizer samples received from field.

PRINCIPLE:

Log-in liquid fertilizer samples for analysis.

REAGENTS AND CHEMICALS:

None

APPARATUS AND EQUIPMENT:

None

SAMPLE PREPARATION AND PROCEDURES:

Remove liquid sample from shipping carton and inspect for leakage.

If evidence of sample loss is apparent, consult with the laboratory chief or administrator to determine if volume of remaining sample has been compromised.

If volume has been compromised, discard sample and submit sample reports to the laboratory chief/administrator.

If no leakage has occurred, place sample on receiving table in numerical order as determined by the inspector's number.

Log sample into system by "Numbering" sample applying "Official Number" to sample/container, report sheet, and tag.

Place in numerical order on the sample cart with dry mix fertilizers that are to be prepared for analysis.

OPERATION AND MAINTENANCE SECTION

DT - 3000 DOWN DRAFT UNIT

PERSONAL PROTECTIVE EQUIPMENT:

The following Personal Protective Equipment must be worn when unit is in operation:

Eye protection/safety glasses
Ear protection
Laboratory smock
Protective gloves (optional)

SAFETY WARNINGS:

The DT-3000 shall be used for the preparation of fertilizer samples only; never use either unit for the collection of dust or vapors from any other material.

Under no condition should any burning object be allowed into the hood or duct system of the unit.

Always disconnect the unit from its power source before inspecting or servicing.

Do not run motor with doors open or filters removed. The motor will overload and possible failure will result.

OPERATIONS:

Switch the unit "on" and check pressure gauge recording pressure reading.

During daily operation, if pressure rises 2.0" higher than initial reading, turn unit off and clean filters with "Vibra Pulse" system as described in the Daily Maintenance Section below.

After filters are clean, restart unit and observe pressure reading.

At the end of each work day or when daily operations cease, cut the unit off and allow the motor blower to come to a complete rest.

Follow daily maintenance protocol listed below.

DAILY MAINTENANCE:

With down draft unit turned on:

Laminated table top - clean using vacuum cleaner with brush attachment. Wipe with liquid cleaner/wax. Set to one side.

Fiberglass grate - clean using vacuum cleaner with brush attachment. After grate is clean, remove from unit and set to one side.

For ZM 100 or Mikro Samplmill, clean opposite grate - slide mill over to clean grate and continue by cleaning other grate.

Return ZM 100 or Mikro Samplmill to proper placement.
Deflectors & side panels - clean using vacuum cleaner with brush attachment.
Using cleaner containing wax, spray a protective coating on surface, wiping any excessive off.
Return fiberglass grates to their normal position.

Turn unit off waiting for complete halt - then - turn compressed air on and clean cartridge filters located inside unit using "Vibra Pulse" system.

Locate 3 push/pull knobs located at the end of the unit that activate the cleaning process. (The top knob activates cleaning process for filters 1 & 2, middle knob activates cleaning process in filters 3 & 4, bottom knob cleans filter 5 - Figure 16 in Owners Manual)

Top knob - **press knob in** and hold for approximately 10 seconds. After waiting for the air supply to refresh, **pull knob out** and hold for approximately 10 seconds. Go to middle knob.

Middle knob - press knob **in** for approximately 10 seconds. Pull knob **out** for approximately 10 seconds. Go to bottom knob.

Bottom knob - press knob in for approximately 10 seconds. Pull knob out for approximately 10 seconds.

Repeat each step 2 additional times for a total of 30 seconds cleaning on each filter.

Bottom tray - clean tray using a vacuum cleaner with brush attachment.

Spray protective coating of cleaner containing wax onto surface of tray, wiping excess off.

Return bottom tray to its normal position.

Turn compressed air lever to the off position.

Vacuum cleaners - inspect daily, dump and clean as needed.

MONTHLY MAINTENANCE:

Upper Catch Tray

Turn power off to unit.

Remove table grating and deflectors.

Scoop out or vacuum out collected fertilizer particles.

Protect metal by spraying Lemon Pledge onto tray wiping excess wax off.

Replace deflectors and grating.

SEMI-ANNUALLY MAINTENANCE:

B-1 Blower (Figure 9, Owners Manual) requires little or no routine servicing.

Motor, blower wheel and motor compartment gaskets should be checked twice a year under normal use.

Refer to Owners Manual, figure 10 and 11 for service and maintenance information

YEARLY MAINTENANCE:

Vertical exhaust box filters - yearly inspection

For additional information concerning operation and maintenance of Down Draft Unit, Model DT- 3000, refer to Owners Manual.

OPERATION AND MAINTENANCE MIKRO-SAMPLMILL

PROCESS DESCRIPTION:

Grinding and pulverizing are processes in which materials are reduced in size as they are impacted by high speed rotating hammers. The term “pulverizing” is applied to fine grinding and derives from the word “polvo” which means dust.

Fertilizer is fed into the hopper, which is mounted above the feed screw. A manually operated screw conveys the material in a uniform fashion to the grinding chamber.

The hammers impact the fertilizer as it enters the grinding chamber propelling it toward the liner. This action fractures the material and is repeated until the particle size is small enough for the entire product to pass through the screen located at the bottom of the body.

GENERAL SAFETY RULES:

The following Personal Protective Equipment must be worn when operating the Mikro-Samplmill:

Laboratory smock

Eye protection

Hearing protection

Protective gloves - optional

Only FERTILIZER MATERIAL is to be pulverized in the mill. No metals of any kind should be introduced into the mill during the grinding process.

Turn electrical power off at the breaker box before performing any maintenance or service to the mill.

All safety guards must be in place when operating the mill.

Should abnormal levels of vibration or noise develop, immediately turn off the mill and investigate the problem. Do not restart the mill until the problem has been corrected.

PRECAUTIONS BEFORE START-UP:

The Down Draft Table has been turned on before operating the Mikro-Samplmill.

All bolts are properly tightened.

The housing cover (door) is properly closed.

Lubrication levels have been checked.

Mill platform is free of tools and safety guards are in place.

START-UP:

Start the pulverizer motor by pushing the start push-button.

Turn feed screw and listen to the sound the mill makes before a sample is introduced into it.

Slowly pour fertilizer sample into the hopper while at the same time turning the feed screw.

Listen to sound the mill is producing while under a load.

Adjust feed screw rate according to the motor load.

Stop turning feed screw if the mill sounds like it is bogging down.

Allow mill time to pulverize what has already been introduced into the grinding chamber.

When the sound generated by the mill returns to normal, slowly introduce additional sample by turning feed screw.

Wearing protective glasses, look into the hopper and determine when all of sample has been introduced into the grinding chamber.

SHUT-DOWN:

At the end of the grinding cycle, or at any time during the grinding operation, the mill can be stopped using the following procedure:

Stop turning the feed screw

Continue to run the mill until the grinding chamber is empty. (Motor sounds unloaded)

Push the STOP button and allow the mill to come to a complete stop.

Open door slowly and inspect material. All of the fertilizer should be pulverized. If not, close door and lock. Restart mill and run for several seconds to complete pulverization process.

MAINTENANCE (Refer to Operating and Maintenance Manual - Section VI):

Oil sight glass - check daily. Make sure the mill is level so that both bearings will be properly lubricated. (Never add oil while the unit is running.)

Change oil semi-annual - drain old oil through the drain plug located on the side of the bearing housing and refill through the fill plug located at the top.

(Recommended oil - SAE 20 grade, non-foaming, non-detergent oil)

Check rotor bearing housing daily for any unusual temperature change. If at any time the bearing housing temperature feels hot to the touch, the bearings are heating up and require attention. (To change bearings, refer to Section 6-3.4 in the Operation and Maintenance Manual)

The screen should be replaced when the pulverized material will not pass through the following sieves.

Sieve, Tyler equivalent twenty four (24) mesh, Sieve No. 25, opening micrometer seven hundred ten (710) or opening in inches of .278 inches for "First."

Sieve, Tyler equivalent thirty five (35) mesh, Sieve No. 40, opening micrometer 425, and opening in inches of .0165 inches for "Seconds."

Pressed rotor should be replaced when the hammer tips are noticeably worn and sample is not pulverized properly.

Smooth liner should be replaced when, after a new stamped rotor is installed, the space between the tips of the hammers and the worn liner is so great that the sample is not properly pulverized as material passes between the hammer and the liner.

Drive belt - check monthly for signs of damage or wear. To change refer to Operation and Maintenance Manual, Section 6-3.5.

Troubleshooting Chart - refer to Section 6-3.6, pages 1-3.

OPERATION AND MAINTENANCE DEHUMIDIFIER UNIT (HC-300-EA) & AIR CONDITION UNIT

DEHUMIDIFIER UNIT PROCESS DESCRIPTION:

To remove moisture from the air, a honeycomb wheel is lined with desiccant material. As humid air passes through the honeycombs, moisture is absorbed on the desiccant thus removing moisture from the air. This dryer air (processed air) is vented back into the room while the moisture is “stored” on the honeycomb.

The desiccant will give up moisture when it is heated. A stream of air taken from outside the control area is heated with an electric heater and passed through channels in the honeycomb wheel over the desiccant “storing” moisture. The desiccant releases the moisture into the heated air stream. This damp “reactivation” air is vented outside.

The moisture has been removed from the air and stored on the wheel, then removed from the wheel and vented outside. Both actions take place simultaneously but on different sections of the wheel, which are sealed from each other.

DEHUMIDIFIER CONTROL PANEL AND INDICATOR LIGHTS

Auto/Off/Manual Switch - amber light - is always on to indicate power to the unit.

Auto position - the unit is under control of the remote humidistat cycling on and off. (The amber light is on.)

Off position - The heating element is turned off. The process and reactivation blowers continue to run to cool down the heating element. Once the heating element is cool, the blowers will cut off. (The amber light will stay on.)

Manual position - The unit is not under the control of the humidistat and will run continuously until switched to the off position or auto position. (The amber light will stay on.)

Running light (green light) - indicates that the unit is in continuous run or manual mode or if in auto position, has cycled on under the control of the humidistat (the contacts are closed).

Fault light (red light) - turns on when the unit overheats.

Time meter - indicates how many hours the unit has operated.

Note: For maintenance situations - **Never** cut the power off at the breaker box before the switch has been turned to the Off position and the unit has had enough time to cool down. If power is cut off at the breaker, the power to the fans will also be cut off allowing the heating elements to overheat creating a possible fire hazard.

After the fans have cooled the unit, they will automatically stop but the operator must hear them stop. The amber light will stay on. At this time, cut the power off at the breaker box before starting any maintenance.

DEHUMIDIFIER UNIT - GENERAL SAFETY RULES:

A laboratory smock and eye protection is required when performing maintenance on the unit. Before performing any maintenance on this unit, refer to Dehumidifier Operation and Maintenance Manual, Section 2 - Safety Notes. (All electrical problems should be deferred to General Services.)

DEHUMIDIFIER UNIT - MAINTENANCE:

Air condition filter located outside the unit - replace monthly
Expanded metal filters (2) located inside unit - clean monthly. Refer to Section 4-1 for maintenance details.

Honeycomb wheel:

Monthly - check wheel looking for signs discoloration caused by dirt, dust, or other foreign materials.

Semi-annual - remove wheel and clean following instructions in section 5.10. Do not wash but clean using compressed air and hood.

Upper and Lower air seals - check monthly following section 4.3 of Operation and Maintenance Manual.

Reactivation Outlet Temperature - check monthly following section 4.4 of Operation and Maintenance Manual.

DEHUMIDIFIER UNIT - OPERATIONS:

(Note: If the down draft unit is off, the dehumidifier unit should be running on automatic. If the down draft unit is on, the dehumidifier unit should be operating on manual setting)

Before sample preparation procedures are started, turn the unit to manual setting (control panel) to lower the humidity in the room to lowest acceptable level.

After sample preparation is complete, during lunch or at the end of each day, set the control switch to automatic on both units allowing the humidistat to control the unit.

Leave both units turned off during weekends or holidays. Upon your return, turn both units on setting control knob on manual.

DEHUMIDIFIER UNIT - TROUBLESHOOTING:

Refer to Operating and Maintenance Manual, Section 5 if trouble conditions exist. Pay particular attention to safety messages.

AIR CONDITIONER UNIT

PROCESS DESCRIPTION:

The air conditioner unit must work in conjunction with the dehumidifier systems, which increases the temperature of the air in the sample preparation area. The air conditioner unit lowers the temperature in the room to a comfortable level. It also helps reduce the amount of moisture the air in the room can hold.

OPERATIONS:

At the start of each work day, at the thermostat, turn the air condition unit to the “ON” position. Set the thermostat between 65 and 70 degrees (lower if necessary.) At this setting, the air conditioner unit will not cycle on and off but remain running constantly. The temperature in the room will be lowered helping reduce the amount of moisture in the room.

At the end of the work day, turn the thermostat to “AUTO.” You may want to move the thermostat to a setting above 75 degrees.

GENERAL SAFETY RULES:

A laboratory smock and eye protection is required when performing maintenance on the unit. Turn power off to unit before performing any maintenance on air filters.

MAINTENANCE:

Monthly, clean or replace air filters.

Notify Maintenance Section for all other maintenance situations.

SOP 106A: PULVERIZING A SAMPLE USING MIKRO-SAMPLMILL

SCOPE:

To convert a granulated material into a powder of uniform consistency.

PRINCIPLE:

A granular fertilizer sample is pulverized to the degree that particles are reduced to a size and will pass through a standard size screen.

APPARATUS AND EQUIPMENT:

Mikro-Samplmill equipped with a No. 3481, .020 RD, PE, 24 Gauge 304 Screen
Wire brass brush - wooden handle
Large and small bottle brush
Scraper or knife
Small, medium and large riffle with cut-off gate accompanied by appropriate pans
Glazed butcher's paper, 24 inches by 36 inches
Shop vacuum with attachments
Sieve as described in SOP 107

Personal Protective Equipment:

Protective gloves (optional)
Safety goggles or safety glasses with side shields
Laboratory smock
Ear protection

Model DT-3000 Down Draft Unit

SAMPLE PREPARATION PROCEDURES:

At the beginning of each work period, open the grinding chamber door and vacuum the grinding chamber and screen area. Close and lock the door.

Remove the catch cup from mill and brush out. Re-attach in proper position.

Place clean plastic pan in position beneath catch cup.

After mill is clean, turn power on and listen to high pitch sound made by mill before sample is introduced into it.

Slowly introduce 8-ounce analytical sample into the hopper while turning feed screw located in front of mill.

Without removing ear plugs, listen to sound generated by mill as sample is introduced. The sound of the rpm's should drop slightly then remain "constant" as the sample is "fed" into the mill.

A sharp fall in sound indicates the mill is laboring. The sample may be too wet or it may have fed into the mill too quickly.

Stop turning feed screw until rpm's have increased to normal sound. If the sample is too wet, the mill may completely stop.

Turn power off and open door. Remove sample from grinding chamber and screen with knife/scrapper.

Replace screen with one having larger openings.

Close and lock door.

Turn mill on and reintroduce sample slowly. After entire sample has been introduced into the mill, while turning feed screw, look into hopper and determine if all of sample has been fed into the grinding chamber.

After hopper is empty, remove feed screw and carefully plunge bottle brush into feed screw opening to move any remaining sample into the grinding chamber.

Reinsert feed screw into proper position.

Turn power "Off" and allow mill to come to a complete stop.

Open mill door slowly.

Make sure there is no "Unground" sample remaining in grinding chamber. If so, collect and close door. Restart mill for several seconds, then recheck sample.

When grinding is complete:

Hold the plastic pan under open door and using wire brass brush, carefully collect sample from inside surface of door.

Use bottle brush to clean out inside opening of the feed screw.

Lightly tap the mesh screen and retainer with brush. Remove and clean using wire brush collecting sample in plastic pan.

Place clean screen and retainer to one side.

Using bottle brush, carefully sweep & clean inside of grinding chamber in a circular motion sweeping the sample through opening in lower portion of grinding chamber. (Be careful not to lose any sample through the open door.)

Plunge large bottle brush into the screen opening located at the bottom of the mill body to dislodge and sweep sample into collection cup. (Most of sample will be collected using large bottle brush.)

For any remaining sample, use small bottle brush and carefully sweep all remaining sample into the collection cup.

Using small spatula, remove any sample trapped in corners of mill or screen retainer area. (Take care not to damage exposed gaskets.)

Remove collection cup containing sample from mill and dump contents into the plastic pan.

Using large bottle brush, with circular motion, remove any remaining sample from inside sample cup into the plastic pan. Set cup to one side.

Dump sample from plastic pan into sieve for next stage of sample preparation. (butcher paper under sieve)

Use large bottle brush to remove any sample remaining in plastic pan.

Place empty plastic pan in position for next sample.

Prepare mill for next sample by:

Use large bottle brush and sweep out hopper area.

Remove sample feed screw and vacuum out the feed screw area. Place feed screw back into proper position.

Using the vacuum and clean the grinding chamber, screen opening, metal cup, screen, retainer and plastic pan.

After mill is clean:

Insert screen and metal retainer into proper position.

Close and lock door.

Return collection cup to proper position.

Vacuum off outside of mill to remove any dust residue of previous sample.

APPROVAL:

Approved by: Leigh Humphreys Date: 5/14/03
Signature

Bureau Chief

Title