

AGITATION EFFECTIVENESS

RL0691

PREPARED FOR: ALBERTA AGRICULTURE,  
ENGINEERING SERVICES BRANCH  
DATE: MAY, 1992

MANAGER: \_\_\_\_\_

R. P. ATKINS

PROJECT ENGINEER: \_\_\_\_\_

M. LEWIS

## TABLE OF CONTENTS

	<u>Page</u>
INTRODUCTION	1
TEST PARAMETERS	1
PESTICIDE FORMULATIONS	1
AGITATION MODES	2
SPRAYER CONFIGURATION	3
AGITATION TESTS	3
SOLUTIONS	4
EMULSIONS	4
SUSPENSION	5
WHAT NEEDS TO BE DONE	6
SPRAYER AGITATION EFFECTIVENESS TESTING PROCEDURE	6
WETTABLE TO POWDER - GRAVIMETRIC TEST	6
TEST PROCEDURE - OTHER	10

## APPENDICES

APPENDIX I	
Proposed Test Method for Particulate Matter in Water	
APPENDIX II	
Sample Data Sheet, Agitation Effectiveness Testing	
APPENDIX III	
Crucible Constant Weight Determination	

## **INTRODUCTION**

The objective of this research project was to devise a standard test that can be used to determine the effectiveness of agitation in field sprayers. Requirements for an effective agitator are low toxicity and time efficient.

## **TEST PARAMETERS**

### **PESTICIDE FORMULATIONS**

There are three different formulations typically used in field sprayers. These are:

1. Solutions (water soluble or liquid),
2. Emulsifiable Concentrates,
3. Suspensions (wettable powders and dry and liquid flowable).

Following is a list of typical herbicides common to each type.

SOLUTION	EMULSIFIABLE CONCENTRATE	SUSPENSION
2,4-D AMIBEN (chloramben) AMITROL-T (amitrole) AMIZINE (amitrole + simazine) (atrazine) AVENGE (difenzoquat) BANVEL (dicamba) BASAGRAN (bentazon) BLADEX LIQUID (cyanazine) BLAGAL (cyanazine + MCPA-K) CERONE (ethphon) DYCLEER (dicamba) DYCLEER 24 (dicamba + 2,4-damme) DYVEL (dicamba + MCPA-K) GRAMOXONE (paraquat) KIL-MOR (2,4-D + mecoprop + dicamba) KRENITE (fosamine) LONTREL (clopyralid) MCPA (amine, salts) MECOTURF (mecoprop) REGLONE (diquat) ROUND-UP (glyphosate) RUSTLER (glyphosate + 2,4-D) SWEEP (paraquat) TARGET (MCPA + mecoprop + dicamba) TORDON 202C (picloram + 2,4-D) TROPOTOX PLUS (MCPB + MCPA) VELPAR (hexazinone)	2,4-D (atrazine) AVADEX BW (triallate) BUCTRIL M (bromoxynil + MCPA) CARBYNE ZEC (barban) DESORMONE LV 70 (2,4-D + dichlorprop) DUAL (metolachlor) EMBUTOX (2,4-DB) EPTAM (EPTC) ESTAPROP (2,4-D + dichlorprop) FUSILADE (fluazifop-butyl) HOE-GRASS II (diclofop-methyl + bromoxynil) HOE-GRASS 284 (diclofop-methyl) MATAVEN L (flamprop-methyl) MCPA (esters) PARDNER (bromoxynil) POAST (sethoxydim) RIVAL (trifluralin) SABRE (bromoxynil + MCPA) STAMPEDE 360 (propanil) STAMPEDE CM (propanil & MCPA) SUTAN (butylate) TORCH DS (bromoxynil) TREFLAN (trifluralin) TRIFLUREX (trifluralin)	AFOLAN F (linuron) ALLY (metsulfuron methyl) (atrazine) BLADEX 80 W (cyanazine) EDGE (ethafluralin) GLEAN (chlorasulfuron) HYVAR X (bromacil) KARMEX (diuron) KERB 5OW (propyzamide) KROVAR I (bromacil + diuron) LADDOCK (bentazon + atrazine) LEXONE (metribuzin) LOROX (linuron) PATORAN (metobromuron) PRIMEXTRA (metolachlor + atrazine) PRINCEP NINE-T (simazine) SENCOR (metribuzin) SINBAR (terbacil) SPIKE (tebuthuron) VELPAR (hexazinone)

### AGITATION MODES

There are three different modes of agitation. These are:

1. Initial Agitation: This is where the desired formulation is introduced to the system by the specified method. The speed the formulation disperses at its uniformity indicate initial agitation effectiveness.

2. Re-agitation: This is where a previously introduced uniformly distributed solution formulation is allowed to settle for a specified time in the spray tank. Then, the agitation system is operated and the speed the formulation disperses and its uniformity indicate reagitation effectiveness.

3. Maintenance Agitation: This is the agitation available while the sprayer is actually spraying. How uniform the dispersed formation remains indicates maintenance agitation effectiveness.

### **SPRAYER CONFIGURATION**

The main purpose is to get an idea of the relative effectiveness of agitation systems between different sprayers. In addition, differences between different configurations on the same sprayer can be considered. Some of the configurations considered include the following:

#### **Specific to individual sprayer:**

1. Agitator Type - hydraulic, mechanical, sparge
2. Agitator Orientation - horizontal, vertical
3. Agitator Location - top, bottom, left, right
4. Number of Agitators

#### **Variables within a sprayer:**

1. Orifice Size (hydraulic agitators)
2. Agitator Flow - depends on nozzle flow, pump condition, etc.
3. Induction Method - top fill, easy fill, etc.

### **AGITATION TESTS**

To test all chemicals in each agitation mode and for all sprayer configurations is impossible given time constraints. So,

the first step is to narrow down the field of chemicals to a single representative of each formulation type (solution, emulsion or suspension). Further reduction to a single formation is not suggested as correlation of agitation effectiveness between formulation types is not immediately obvious.

### **SOLUTIONS**

Water soluble formulation remains in a solution after being initially dispersed. Thus for these formulations, re-agitation and maintenance agitation are not applicable. Thus only initial agitation effectiveness can be measured.

Tests were carried out using a water soluble formulation (Fastgreen FCX) (see Appendix I). Four different orifice sizes were used as well as two different induction methods; c/o CONC vs. time, profiles were established for each configurations. The results show measurable differences in the effectiveness of each configuration. The absolute times to reach "uniformity" were not large (y1 - 2 mm) as the solution dispersed readily.

Consequently, extension of results to practical application where formulations are much harder to disperse run the risk of presumption. Therefore, without correlation work, the results are not very practical. The advantages of this method are that it is quick (1.5 hr/run), easy (concentration measured with spectrophotometer) and non-toxic.

## **EMULSIONS**

An emulsion is a colloidal suspension of one liquid in another. An emulsion in water can run from high rates of settling to being suspended indefinitely. For stable emulsions, only initial agitation can be tested.

Limited testing (experimenting) was done with an emulsifiable concentrate, namely, Heliose 10C. Heliose 10C forms a stable emulsion in water and dispenses readily. Essentially, it appeared to behave similar to the Fast Green FCF solution. Consequently, actual agitation tests were not performed.

The disadvantages to using this type of emulsion are as follows:

- Heliose 10C is flammable and precaution must be taken.
- Heliose 10C is slightly toxic [ORAL LD<sub>50</sub> (rats) y 4000 mg/kg]
- Slightly toxic to fish thus cannot dispose of through sewer system.

### **SUSPENSION**

Suspension are formed from wettable powders, dry flowables and liquid flowables. Settling rate of suspensions would depend on particle size and specific gravity. All three agitation modes could be tested with a suspension formulation. Samples could be measured gravimetrically or by hydrometry.

Two types of suspension could be used in testing:

- 1) Wettable Powder Blank
- 2) Cupravit [ISO 5682/2 - 1986 (E)]

A wettable powder blank may be available from Chem-Agro. This would provide realistic data that could be most easily related to typical wettable powder field chemicals.

Cupravit (if available) would give results that may be compared to others done by this same standard.

## WHAT NEEDS TO BE DONE

Pursue suspension formulation testing.

### **Formulation:**

1. Wettable Powder - order wettable powder blank  
(Murray-March)
2. Cupravit - investigate ISO standard further  
(Rick-March/April)

### **Testing:**

1. When - July (Murray)
2. Where - Lab
3. Equipment - write of test equipment needed (Murray-June)
4. Procedure - devise test procedure (Murray-June)
5. Sample Measurement - Methods, ASTM etc. (Murray-April);  
equipment (Murray-June)
6. Report

## SPRAYER AGITATION EFFECTIVENESS TESTING PROCEDURE

### WETTABLE TO POWDER - GRAVIMETRIC TEST

#### **1. Scope**

1.1 This method covers determination of the mass concentration of suspended solids at different times during the re-agitation of a wettable powder solution in an agricultural field sprayer tank.

1.2 This method adopts procedure for measuring the sample particulate matter concentrations from the proposed ASTM test

method titled: *Proposed Test Method For Particulate Matter in Water.* (See Appendix I)

## **2. Applicable Documents**

## **3. Summary of Method**

3.1 Sprayer to be tested should be set-up and outfitted with the following equipment:

- pressure gauge to monitor pump output pressure
- pressure gauge to monitor agitator pressure
- sample take-off valve.

3.2 Sprayer tank is filled with water, wettable powder is added and mixture is agitated fully.

3.3 After the tank contents have settled a requisite amount of time, the agitation system is started and samples are collected at specified time intervals.

3.4 The particulate matter is removed from the measured volume of sample by filtration through a glass microfiber filter medium and through a glass microfiber prefilter (if necessary).

3.5 The amount of residue obtained on the filter is determined gravimetrically after drying to constant weight at  $104 \pm 1^{\circ}\text{C}$ .

3.6 The particulate matter is calculated and reported in milligrams per litre.

## **4. Significance**

## **5. Interferences**

## **7. Apparatus**

7.1 Analytic Balance - capable of weighing to 0.1 mg.

7.2 Dessicator - use activated silica gel (indicating type) or equivalent.

7.3 Drying Oven.

7.4 Filtration Apparatus.

7.4.1 Filter holder - Gooch Crucible and adapter.

7.4.2 Gooch Crucible - 30 ml (20).

7.4.3 Suction Flash - 500 ml (2).

7.4.4 Suction Pump - 1 atm.

7.5 Glass Fiber Filter Disk, Prefilter size (Whatman type GF/D), 47 mm $\varnothing$ . (This may need to be trimmed.)

7.6 Glass Fiber filter Disk, Final filter (Whatman type 934-AH) 32 mm $\varnothing$ .

7.7 Crucible tongs.

## **8. Reagents**

8.1 Purity of water.

8.1.1 Spray tank water is tap water.

8.1.2 Distilled water used for gravimetric procedure.

## **9. Sampling**

## **10. Preparation of Apparatus**

10.1 Sprayer.

10.1.1 Predetermine operation parameters (agitator pressure).

10.1.2 Close off regulator valve (may not affect results).

10.1.3 Set-up sprayer monitors.

10.1.3.1 Monitor of dump output pressure.

10.1.3.2 Monitor of agitator pressure.

10.1.3.3 Sample take of valve (pressure side of pump not with pump outlet and boom valves).

Note: Zero-flow portion should be as short as practical.

10.1.4 Use graduated cylinders to collect samples from same take-off valve.

10.1.5 Sprayer should be set up level.

10.2 Gravimetric test (as per Appendix I, Section 10).

## **11. Procedure**

11.1 Collecting Samples.

11.1.1 Bring spray pump to op. temp. (Hyd models) by pumping at cut-off pressure (no agitation).

11.1.2 Open agitator and simultaneously start time.

11.1.3 Open sampling valve to desired flow.

11.1.4 Collect samples at desired time interval in graduated cylinders (100 ml; 80-90 ml samples).

Note: Sampling valve may be closed b/w long sample interval but should be opened a few seconds before sample time in order to obtain a representative sample.

11.1.5 After collecting all mixing samples, leave agitator running and mechanically mix (w/paddle) to ensure complete mixing. Then take a control sample in same fashion as other.

11.1.6 Shut off pump and agitator valve and allow tank contents to sit a prerequisite amount of time before resampling.

11.2 Gravimetric Analysis (as per Appendix I, Section 11, Omit 11.1).

**TEST PROCEDURE - OTHER**

1. Wettable powder blank: needs to be ordered in the spring (during plant production runs).
2. Time required for Tare Crucibles to reach constant weight - use two hours. (See Appendix III)
3. For Crucible with sample dry approximately 24 hours.
4. Double set of Crucibles are needed for a one day cycle.

**APPENDIX I**

**Proposed Test Method for  
PARTICULATE MATTER IN WATER**

# Proposed Test Method for PARTICULATE MATTER IN WATER<sup>1</sup>

This proposed method has no status as an ASTM Standard and is published on behalf of the sponsoring committee for information only for maximum of two years. Comments are solicited and should be addressed to ASTM, 1916 Race St., Philadelphia, Pa. 19103.

## 1. Scope

1.1 This method covers determination of the mass concentration of particulate matter, sometimes referred to as suspended solids, in water including those waters which may contain industrial wastes, very fine particles, powdered carbon, and bacterial slimes.

1.2 This method is applicable to the determination of particulate matter covering the range from 1 mg/L to 30 000 mg/L, depending upon the sample size chosen.

1.3 The analyst is responsible for determining that this method is applicable to the water matrix being tested.

## 2. Applicable Documents

### 2.1 *ASTM Standards:*

D 1129 Definitions of Terms Relating to Water<sup>2</sup>

D 1192 Specification for Equipment for Sampling Water and Steam<sup>2</sup>

D 1193 Specification for Reagent Water<sup>2</sup>

D 3370 Practices for Sampling Water<sup>2</sup>

## 3. Summary of Method

3.1 The particulate matter in the sample is resuspended, either mechanically or manually by shaking the sample container, in order to obtain a representative sample for analysis.

3.2 The particulate matter is removed from a measured volume of sample by filtration through a glass microfiber filter medium, and through a glass microfiber prefilter, if necessary.

Note 1 - Particulate matter, as determined by this test method, is implicitly defined as that which is retained by a specific glass-fiber filter and may or may not give a significant difference in the result when the same sample is passed through a membrane filter.

3.3 The amount of residue obtained on the filter is determined gravimetrically after drying to constant weight at  $104 \pm 1^\circ\text{C}$ .

3.4 The concentration of particulate matter is calculated and reported in milligrams per litre.

## 4. Significance

4.1 Excessive or abnormal amounts of particulate matter upon settling (1) could lower the esthetic quality of waters, (2) might cause the fouling of both natural and man-made waterways, and (3) may impair or eliminate the growth of aquatic animal and plant wildlife. The method presented here is capable of the measurement of various concentrations of particulate matter in the selection sample.

## 5. Definitions

5.1 For definitions of terms used in this method, refer to Definitions D1129.

## 6. Interferences

6.1 Some dried residues readily absorb moisture. Rapid weighing is essential to this method.

6.2 An excessive amount of residue from too large a sample can entrap water and require a prolonged drying period. Be sure the dried residue has reached constant weight.

6.3 The filtration apparatus, filter media, pre-washing, post-washing, and drying temperatures are specified because studies have shown that these variables can affect results.

## 7. Apparatus

7.1 *Analytical Balance*, capable of weighing to 0.1 mg.

7.2 *Desiccator* - Use activated silica gel (indicating type), or equivalent, as the desiccant.

7.3 *Drying Oven* - Use a mechanical convection oven, if possible, to reduce the drying time.

7.4 *Filtration Apparatus*:

7.4.1 *Filter Holder* - A Gooch crucible and adapter, a membrane filter holder, or a Büchner funnel, as needed.

7.4.2 *Gooch Crucible* - Use either a 40 mL or 130 mL capacity crucible, depending on the same to be analyzed.

7.4.2.1 See Section 11 for the preparation of a Gooch crucible or other filtration device.

7.4.3 *Suction Flask*, 500 mL or 1 L capacity.

7.5 *Glass Fiber Filter Disk, Prefilter*<sup>3</sup>, without organic binder, 2.5 cm, 3.5 cm diameter or larger, depending on the size of the filtration apparatus used.

7.6 *Glass Fiber Filter Disk, Final Filter*<sup>4</sup>, without organic binder, 2.4 cm, 3.2 cm diameter or larger, depending on the size of the filtration apparatus used.

Note 2 - Because of the physical nature of glass fiber filters, the absolute pore size cannot be controlled, measured, or stated.

7.7 *Finger Cots*<sup>5</sup>, disposable latex.

7.8 *Crucible Tongs*.

- 7.9 *Mechanical Agitation Device.*
- 7.10 *Metal Planchet, light-weight.*
- 7.11 *Forceps.*

## **8. Reagents**

8.1 *Purity of Reagents* - Reagent grade chemicals shall be used in all tests. Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available.<sup>6</sup> Other grades may be used, provided it is first ascertained that the reagent is of sufficiently high purity to permit its use without lessening the accuracy of the determination.

8.2 *Purity of Water* - Unless otherwise indicated, references to water shall be understood to mean reagent water conforming to Specification D 1193, Types I or II.

## **9. Sampling**

9.1 Collect the sample in accordance with the applicable ASTM methods as follows: D 1192 and D 3370.

9.2 Nonrepresentative particulates such as leaves, sticks, fish, and lumps of fecal matter should be excluded from the sample if it is determined that their inclusion is not desired in the final result.

9.3 Preservation of the sample is not practical; analysis should begin as soon as possible. If the sample cannot be analyzed immediately after collection, refrigeration or icing at 4°C may be useful in minimizing microbiological decomposition of solids.

## **10. Preparation of Apparatus**

10.1 Prepare a Gooch filter crucible as directed:

10.1.1 Place a glass fiber filter disk, the final filter (7.6), in the crucible, wrinkled surface up.

10.1.2 Assemble the crucible and its adapter on a suction flask.

10.1.3 Use water, with applied vacuum to the suction flask, to seat the filter disk in the crucible.

10.1.4 Turn off the vacuum and gently relieve the suction on the crucible.

10.1.5 place a prefilter (7.5), if necessary, on top of the final filter (7.6) or go to 10.1.6.

NOTE 3 - A glass microfiber prefilter can be used, based upon the judgment and experience of the analyst, to improve upon the sample filtration rate by reducing the rate at which the final filter is clogged with fine particulate matter. More than one prefilter, if necessary, may be used to protect the final filter.

NOTE 4 - Do not squeeze or distort the prefilter as this action may reduce its efficiency.

10.1.6 Apply vacuum to the system and wash the assembled crucible and filter(s) three times with successive 20-mL portions of water. Remove all free water by applied vacuum after the third wash and then repeat 10.1.4.

NOTE 5 - This action removes particles and water-soluble substances from the prepared crucible.

10.1.7 Use tongs to transfer the prepared crucible to a drying oven, set at  $104 \pm 1^\circ\text{C}$ , and dry to constant weight. By means of tongs, transfer the crucible to a desiccator and allow to cool to room temperature. Store in the desiccator until ready to use. Weigh rapidly to the nearest 0.1 mg just before use.

NOTE 6 - Use only tongs or disposable latex finger cots, never bare fingers, to handle the prepared crucible during the weighing step.

10.2 Prepare larger capacity filtration devices, as required, by following the general principles of using a prefilter, if necessary, prewashing the filter medium and drying the apparatus to constant weight as given in 10.1.

10.2.1 Use a larger-sized glass fiber filter disk, using either a membrane filter holder or a Büchner funnel to support the filter disk, to achieve the higher capacity.

10.2.2 Remove the glass filter disk from either filter holder used in 10.2.1, and transfer it to an appropriate size light-weight metal planchet for all drying and weighing operations as in 10.1.7, 11.8, and 11.9.

10.2.2.1 Use forceps to handle the filter disk.

NOTE 7 - The weight of either a membrane filter holder or a Büchner funnel may exceed the capacity of an analytical balance, therefore the glass fiber filter disk is removed from the filter holder or funnel prior to the drying and weighing operations.

## 11. Procedure

11.1 *Sample Mixing* - Resuspend the particulate matter in the sample by mechanical agitation (Note 8) or by vigorously shaking the sample container. Remove the sample aliquot, as described in 11.2, while the sample is under mechanical agitation. If the sample was manually mixed, remove the sample aliquot as soon as possible after the mixing is stopped.

NOTE 8 - Mechanical agitation is desirable for samples that contain (1) large amounts of particulates, especially at levels  $>1000$  mg/L or (2) particulates that settle rapidly at any concentration level. Agitation with a magnetic stirring bar is not recommended because (1) magnetic particulates, if present, will be removed and (2) stirring will be inadequate in large containers to mix samples of the types described above.

11.2 Measure out, immediately, from the original sample container, using a dry graduated cylinder an appropriate-sized aliquot of the well-mixed sample (11.1) of sufficient volume to

yield an ideal practical amount of particulate matter.

NOTE 9 - Ideally, the volume of sample chosen shall yield a dry residue weight in the range from 10 to 1000 mg; however, the minimum dry weight shall be 1 mg.

11.2.1 Let the particulate matter in the graduated cylinder start to settle.

11.3 Use tongs for finger cots to place the tared, prepared filter crucible (10.1.7) in an adapter seated on a suction flask. Wet the glass microfiber filter disk(s) with 1 to 2 mL of water added with a medicine dropper and then apply vacuum to seat the disk(s) in the crucible.

NOTE 10 - The analyst has the option to use a tared, prepared filter crucible that contains no prefilter for those samples that present no filtration problems. The filter crucible for such samples is prepared in accordance with 10.1.1 to 10.1.3, 10.1.6. and 10.1.7.

NOTE 11 - Assemble the larger capacity filtration devices, described in 10.2, on a suction flask, wet the filter disk with water, and apply vacuum to seat the disk as described in the preceding paragraphs.

11.4 Begin the sample filtration, immediately after 11.3, by decantation of the supernatant liquid from the graduated cylinder into the prepared filter.

11.5 Continue the filtration until the entire sample is filtered.

NOTE 12 - To achieve rapid filtration, filter the supernatant liquor first while reserving the settled solids for the last part of the filtration. If the solids are not reserved to the end of this step, the filtration may slow down due to premature clogging of the filter medium.

11.6 Transfer quantitatively the sample particles that adhere to the graduated cylinder into the filter with a total of three successive 10 mL water rinses. Let each rinse pass through the filter before adding the next one.

NOTE 13 - Add each rinse to the filter as soon as the last rinse has passed through in order to prevent the filter cake from cracking and thus reducing the efficiency of the rinsing procedure.

11.7 Continue to apply vacuum for about 2 to 3 min after the last wash to remove as much free water as possible from the filtered residue.

11.8 Use tongs to transfer the filter crucible to the drying oven.

11.9 Dry the filter crucible and contents to constant weight at  $104 \pm 1^\circ\text{C}$ . By means of tongs, transfer the crucible to a desiccator and allow to cool to room temperature and rapidly reweigh to the nearest 0.1 mg. Record the weight of residue in milligrams.

## 12. Calculations

12.1 Subtract the weight obtained in 10.1.7 from the weight

obtained in 11.9 and record the difference as the weight of the residue in milligrams.

12.2 Calculate the particulate matter content of the sample, in milligrams per litre, as follows:

$$\text{Particulate matter, mg/L} = (W/V) \times 1000$$

where:

W = milligrams of residue found and

V = millilitres of sample used

### **13. Precision and Accuracy**

13.1 Precision and accuracy will be determined in a future study.

*The American Society for testing and Materials takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.*

## ENDNOTES

1. This method is under the jurisdiction of ASTM Committee D-19 on Water and is the direct responsibility of Subcommittee D 19.05 on Inorganic Constituents in Water. Published for information only, May 1992.
2. *Annual Book of ASTM Standards*, Part 31.
3. Whatman glass microfiber disks, Type GF/D, all-glass with no organic binder, have been found satisfactory for this purpose. Other equivalent glass fiber prefilters may be used.
4. Whatman glass microfiber disks, Type 934-AH, have been found satisfactory for this purpose. Other equivalent glass fiber final filters, such as the Whatman Type 984 H, Gleman Type A or A/E and Millipore AP40 may be used.
5. Finger cots, light rubber, Fisher Scientific Co., Cat. No. 10-001C, have been found satisfactory for this purpose.
6. "Reagent Chemicals, American Chemical Society Specifications," Am. Chemical Soc., Washington, D.C. For suggestions on the testing of reagent not listed by the American Chemical Society, see "Reagent Chemicals and Standards," by Joseph Rosin, D. Van Nostrand Co., Inc., New York, N.Y., and "United States Pharmacopeia."

**APPENDIX II**

**SAMPLE DATA SHEET**

**AGITATION EFFECTIVENESS TESTING**

# AGITATION EFFECTIVENESS TESTING

## DATA SHEET - TEST #2

**DATE:** November 12, 1991

**PROJECT NUMBER:** RL0691

**WATER QUALITY:**

- Temperature: ?
- ph: ?
- Volume (l): 3600
- Source: tap

**SPRAYER CONFIGURATION:**

- Make: Harmon
- Model:
- Agitator: Hydra-Jet (2)
- Orifice: 0.25 in
- Ag. Press: 300
- Pmp press: 440 kPa
- Reg. Pos: closed
- Booms: off

**TESTING CONFIGURATION:**

- Air Temperature:
- Test Type: reagitation
- Settle Time: 23 hr
- Wettable Powder: Placebo DF
- Amount: 2002.8 g

**TEST DATA:**

- Time of Test: 14:00
- Crucibles: prefilters
- Tare In: 15:40
- Tare Out: 14:25
- Gross In: 15:40
- Gross Out: 16.25, November 13, 1991

SAMPLE #	SAMPLE TIME (min)	SAMPLE VOLUME (ml)	CRUCIBLE TARE WEIGHT (g)	CRUCILE GROSS WEIGHT	NET WEIGHT	mg/ml	% CONTROL
1	2	93	24.7313	24.7493	0.018	0.193548	50.82570
2	4	84	24.8938	24.9132	0.0194	0.230952	60.64797
3	BROKEN						
4	6	100	24.7204	24.7432	0.0228	0.228	59.87267
5	8	95	24.9259	24.9488	0.0229	0.241052	63.30029
6	10	95	24.8877	24.9115	0.0238	0.250526	65.78807
7	12	92	24.7349	24.7577	0.0228	0.247826	65.07899
8	14	96	24.9872	25.0104	0.0232	0.241666	63.46153
9	16	94	25.0214	25.044	0.0226	0.240425	63.13561
10	CONTROL	99	25.039	25.0767	0.0377	0.380808	100.0
						1370.909	

**APPENDIX III**

**CRUCIBLE CONSTANT WEIGHT DETERMINATION**

## CRUCIBLE CONSTANT WEIGHT DETERMINATION

- November 7, 1991
- Time required for crucibles to read constant weight
- 3 crucibles, seat filters

CRUCIBLE#	TIME IN	TIME OUT	WEIGHT <sub>1</sub>	WEIGHT <sub>2</sub>	WEIGHT <sub>3</sub>	
1	11:26	11:59	24.6115	24.6106	24.6107	y1 hr
2	11:26	13:36	24.8271	24.8273		y2 hr
3	11:26	12:52	24.7820	24.7815	24.7818	y1½ hr
1	12:52	13:36	24.6106			
2	14:06	14:51	24.8273			
3	13:36	14:06	24.7815			
1	14:06	14:51	24.6107			
2						
3	14:34	15:23	24.7818			

### PROCEDURE:

- Assemble crucibles as per standard
- Place in oven for desired time (oven temperature at 104°C)
- Cool in dessicator
- Weigh (Scale Mettler H35)
- Redry in oven for 1 hr
- Repeat
- Weigh