

Note: This is a reference cited in *AP 42, Compilation of Air Pollutant Emission Factors, Volume I Stationary Point and Area Sources*. AP42 is located on the EPA web site at [www.epa.gov/ttn/chief/ap42/](http://www.epa.gov/ttn/chief/ap42/)

The file name refers to the reference number, the AP42 chapter and section. The file name "ref02\_c01s02.pdf" would mean the reference is from AP42 chapter 1 section 2. The reference may be from a previous version of the section and no longer cited. The primary source should always be checked.



# The ALMEGA CORPORATION

A DIVISION OF NATIONAL AIR NETWORK, INC.

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May 14, 1993

American Maize Products Co.  
1100 Indianapolis Blvd.  
Hammond, Indiana 46320

Attention: Mr. Guy Davis

Subject: **Formal Particulate Emission Testing  
#4 Starch Scrubber**  
American Maize, Hammond, Indiana  
April 13th 1993  
The Almega Corporation Project I-7231  
The Almega Corporation Report I-7231-1

Dear Mr. Davis:

1. INTRODUCTION

- 1.1 A series of formal particulate emissions tests were conducted on the scrubber exhaust of #4 starch dryer at American Maize Products Co. located in Hammond, Indiana, on April 13th 1993.
- 1.2 Emission test methods followed those detailed in Title 40, CFR 60 (Ref. 1).
- 1.3 Emission testing was conducted by Lawrence Fisher and S. Miller of The Almega Corporation using an Andersen Samplers, Inc., USEPA style sampling train.
- 1.4 Two members of Hammond DEM were present to oversee testing throughout the test series.
- 1.5 The process was operated normally by American Maize personnel.
- 1.6 The purpose of this formal test series was to determine emission rates for degree of compliance with applicable Indiana emission standards.
- 1.7 This report summarizes the test methods, procedures, and findings of this test series. Attached as appendices is a complete documentation of all procedures, field test and laboratory analysis data, and calculation summaries.

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American Maize Products Co.

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## 2. SUMMARY OF TEST METHODS

- 2.1 Emission testing was conducted using an Andersen Samplers, Inc. USEPA style sampling train following the procedural requirements as detailed in Title 40: CFR 60 (Ref. 1).
- 2.2 Emission testing was conducted using two sampling ports set 90° apart on the 52" diameter #4 Starch Scrubber exhaust stack.
- 2.3 The selection and location of the sampling points for the sources followed Method 1 (Ref. 1), included in Appendix A. Specifically, sampling was conducted for 2.5 minutes at each of 24 points, 12 on each diameter.
- 2.4 The gas velocity was measured using an S type pitot tube and followed Method 2 (Ref. 1), included in Appendix B.
- 2.5 Integrated gas samples were taken following Method 3 (Ref. 1), included in Appendix C, for determination of CO<sub>2</sub>, O<sub>2</sub> and molecular weight using a Fyrite Analyzer.
- 2.6 Exhaust gas moisture was determined following Method 4 (Ref. 1), included in Appendix D.
- 2.7 Particulate concentration and emission rates were determined following Method 5 (Ref. 1), included in Appendix E. The gas velocity and moisture determination were conducted simultaneously with the particulate emission testing.
- 2.8 The particulate catch included nozzle, probe and prefilter glassware washings and filter particulate gain as detailed in Method 5.
- 2.9 A stainless steel Pyrex glass-lined sampling probe with an appropriately sized stainless steel sampling nozzle were used for three one-hour test repetitions.

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## 3. SUMMARY OF TEST FINDINGS

- 3.1 Particulate concentration and emission rates are summarized in Table 1.
- 3.2 Scrubber and process data are included in Table 2.
- 3.3 Copies of field test data and laboratory analyses are included in Appendix F.
- 3.4 Copies of equipment calibrations and sample chain of custody are included in Appendix G.

## 4. CONCLUSION

- 4.1 A series of formal particulate emissions tests was conducted on the scrubber exhaust of #4 starch dryer at American Maize Products Co. located in Hammond, Indiana, on April 13th 1993.
- 4.2 Testing was conducted following the procedural requirements as detailed in Title 40: CFR 60 (Ref. 1)
- 4.3 Findings of this test series indicate the following particulate concentration and emission rates:

#4 Starch Scrubber  
April 13, 1993

| <u>Repetition</u> | <u>Particulate<br/>Concentration<br/>grains/dscf</u> | <u>Particulate<br/>Concentration<br/>10<sup>-6</sup>lb/dscf</u> | <u>Particulate<br/>Emission Rate<br/>lb/hr</u> |
|-------------------|--|---|--|
| 1                 | .0256  | 3.653   | 7.70   |
| 2                 | .0124  | 1.766   | 3.84   |
| 3                 | <u>.0121</u>   | <u>1.722</u>  | <u>3.50</u>                                    |
| Avg.              | .0167  | 2.380   | 5.01   |

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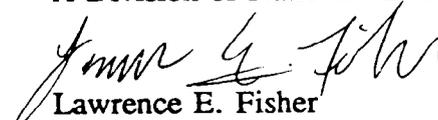
American Maize Products Co.

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4.4 The Almega Corporation is pleased to be of service to American Maize Products Co. and looks forward to further opportunities for providing our services.

Respectfully submitted,

THE ALMEGA CORPORATION  
A Division of National Air Network, Inc.

  
Lawrence E. Fisher  
Project Manager

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TABLE 1

## SUMMARY OF EMISSION TEST DATA

PLANT: American Maize Products Co., Hammond, Indiana  
 SOURCE: Starch Scrubber #4 Exhaust  
 OPERATORS: L. Fisher and S. Miller  
 TEST DATE: April 13, 1993

*Run 1 grain loading in error but mass flux correct DW  
 Check*

|               |                   |                    |                  |
|---------------|-------------------|--------------------|------------------|
| REPETITION #: | 1                 | 2                  | 3                |
| TEST TIME:    | 9:45am<br>10:55am | 11:28am<br>12:31pm | 1:09pm<br>2:11pm |

STACK GAS

|                                       |        |        |        |
|---------------------------------------|--------|--------|--------|
| Temperature, average °F               | 105.3  | 108.0  | 112.6  |
| Velocity, average fps                 | 46.46  | 48.50  | 45.80  |
| Volume flow x 10 <sup>6</sup> scfh db | 2.108  | 2.174  | 2.034  |
| acfm                                  | 41,112 | 42,917 | 40,528 |
| Orsat, average % CO <sub>2</sub>      | 0.0    | 0.0    | 0.0    |
| % O <sub>2</sub>                      | 20.9   | 20.9   | 20.9   |
| Moisture, %                           | 8.0    | 8.7    | 8.8    |

SAMPLE

|                |        |        |        |
|----------------|--------|--------|--------|
| Time, minutes  | 60     | 60     | 60     |
| Volume, scf db | 48.227 | 50.058 | 46.859 |
| Isokinetics, % | 99.0   | 101.4  | 99.7   |

PARTICULATE

|                            |                                   |                   |                   |
|----------------------------|-----------------------------------|-------------------|-------------------|
| Mass collected, mg         | 79.9                              | 40.1              | 36.6              |
| Concentration, grains/dscf | <i>0.0256</i> <del>0.0795</del> ? | <del>0.0867</del> | <del>0.0875</del> |
| Emissions, lb/hr           | 7.70                              | 3.84              | 3.50              |

SCRUBBER WATER

|                               |                    |                      |                    |
|-------------------------------|--------------------|----------------------|--------------------|
| Total Dissolved Solids, g/gal | 3.87               | 5.21                 | 5.55               |
| Total Suspended Solids, g/gal | 33.7               | 37.7                 | 39.0               |
|                               |                    | <u>3.84</u>          | <u>3.50</u>        |
| <i>DW Emission Factor</i>     | <u>7.70</u><br>9.5 | <u>3.84</u><br>10.45 | <u>3.50</u><br>9.5 |
|                               | 0.81               | 0.37                 | 0.37               |

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TABLE 2

## SUMMARY OF PROCESS DATA

|               |   |                |              |
|---------------|---|----------------|--------------|
| PLANT:        | American Maize Products Co., Hammond, Indiana |                |              |
| SOURCE:       | Starch Scrubber #4 Exhaust                    |                |              |
| OPERATORS:    | L. Fisher and S. Miller                       |                |              |
| TEST DATE:    | April 13, 1993                                |                |              |
| REPETITION #: | 1   | 2              | 3            |
| TEST TIME:    | 9:45-10:55 am                                 | 11:28-12:31 pm | 1:09-2:11 pm |

## SCRUBBER PROCESS DATA

|  |        |        |        |
|--|--------|--------|--------|
| Scubber water flow rate, gpm               | 370    | 380    | 370    |
| Scubber pressure drop, in H <sub>2</sub> O | 6.75   | 9.75   | 11.25  |
| pH of scrubber water                       | 5.37   | 4.71   | 4.65   |
| operating load, lb/hr                      | 19,000 | 20,900 | 19,000 |

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**APPENDIX F**

**PARTICULATE FIELD TEST AND LABORATORY ANALYSIS DATA**



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## STACK VOLUME FLOW RATE CALCULATION SUMMARY

COMPANY: American MAZE REPETITION NO: Run 1-3  
 SOURCE: #4 Dryer Scrubber Exhaust TEST DATE: 4-13-93

Dry molecular weight of stack gas

|  | r1           | r2           | r3           |
|--|--------------|--------------|--------------|
| $M_d = 0.44 (\%CO_2) + 0.32 (\%O_2) + 0.28 (\%N_2 + \%CO)$ |              |              |              |
|  | <u>28.80</u> | <u>28.80</u> | <u>28.80</u> |
|  | lb/lb-mole   |              |              |

Molecular weight of stack gas, wet basis

|                                      |              |              |              |
|--------------------------------------|--------------|--------------|--------------|
| $M_s = M_d (1 - B_{ws}) + 18 B_{ws}$ | <u>27.94</u> | <u>27.86</u> | <u>27.86</u> |
|                                      | lb/lb-mole   |              |              |

Pitot tube coefficient

|                                |            |            |            |
|--------------------------------|------------|------------|------------|
| $C_p$ (from calibration curve) | <u>.84</u> | <u>.84</u> | <u>.84</u> |
|--------------------------------|------------|------------|------------|

Average velocity head of stack gas, inches H<sub>2</sub>O

|                          |              |              |              |
|--------------------------|--------------|--------------|--------------|
| $(\sqrt{\Delta P})$ avg. | <u>.7843</u> | <u>.8159</u> | <u>.7674</u> |
|--------------------------|--------------|--------------|--------------|

Average absolute stack gas temperature

|  |              |              |              |
|--|--------------|--------------|--------------|
| $(T_s)$ avg. = $\frac{105.3/108.0/112.6}{1.8} \text{ } ^\circ\text{F} + 460$ | <u>565.3</u> | <u>568.0</u> | <u>572.6</u> |
|  | °R           |              |              |

Absolute stack gas pressure

|   |              |              |              |
|---|--------------|--------------|--------------|
| $P_s = P_B + (P_{stat}/13.6)$                         |              |              |              |
| $(P_{stat} = 1.56/1.62/1.62 \text{ in. H}_2\text{O})$ | <u>29.74</u> | <u>29.75</u> | <u>29.75</u> |
|   | in. Hg       |              |              |

Stack gas velocity

|   |              |              |              |
|---|--------------|--------------|--------------|
| $(V_s)$ avg. = $(85.49) C_p (\sqrt{\Delta P})$ avg. $\sqrt{\frac{(T_s) \text{ avg.}}{P_s M_s}}$ | <u>46.46</u> | <u>48.50</u> | <u>45.80</u> |
|   | ft/sec.      |              |              |

Stack gas volume flow rate

|  |               |               |               |
|--|---------------|---------------|---------------|
| $60 V_s A_s$ ( $A_s = 14,748 \text{ ft}^2$ ) | <u>41,112</u> | <u>42,917</u> | <u>40,528</u> |
|  | acfm          |               |               |

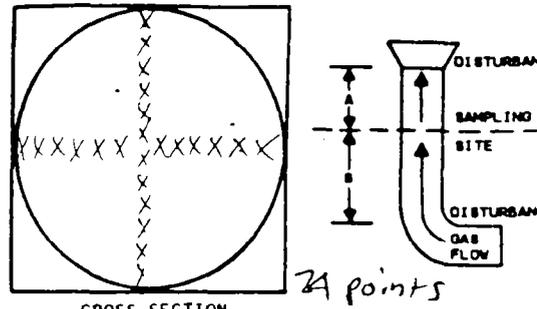
Stack gas volume flow rate, dry basis

|  |                          |              |              |
|--|--------------------------|--------------|--------------|
| $Q_s = 3,600 (1 - B_{ws}) V_s A_s \left[ \frac{T_{std} \cdot P_s}{(T_s) \text{ avg.} \cdot P_{std}} \right]$ | <u>2.108</u>             | <u>2.174</u> | <u>2.034</u> |
|  | x 10 <sup>6</sup> dscf/h |              |              |

|                  |               |               |               |
|------------------|---------------|---------------|---------------|
| $\frac{Q_s}{60}$ | <u>35,135</u> | <u>36,230</u> | <u>33,905</u> |
|                  | dscfm         |               |               |

# PARTICULATE FIELD DATA

↑ NORTH SCHEMATIC OF STACK



PLANT AMERICAN MAZE  
 DATE 4-12-93  
 LOCATION Hammond IN  
 OPERATOR LF MR  
 STACK NO. # 4 Dry  
 RUN NO. 81  
 SAMPLE BOX NO. Fisher #17  
 METER BOX NO. # 3  
 METER ΔH @ .7524  
 Y = 1.0085  
 TIME START = 9:45 AM

AMBIENT TEMPERATURE 45.0  
 BAROMETRIC PRESSURE 29.7  
 ASSUMED MOISTURE, % 8  
 PROBE LENGTH, in. 6' off  
 NOZZLE DIAMETER, in. .250, .249, .251  
 STACK DIAMETER, in. 52"  
 PROBE HEATER SETTING 240 ± 25  
 HEATER BOX SETTING 240 ± 25  
 Δ Cp FACTOR 1.04  
 FILTER NO. 923  
 FILTER TARE WEIGHT 602.0 mg.

PRE TEST LEAK CHECKS  
 METER 0.0 @ 25 in. Hg  
 PITOTS 0 @ 4 in. H<sub>2</sub>O  
 ORSAT OK

| P  | θ    | STATIC PRESSURE<br>+/- in H <sub>2</sub> O | Ts<br>°F | ΔP<br>in H <sub>2</sub> O | √ΔP   | ΔH<br>in H <sub>2</sub> O | Vm<br>ft <sup>3</sup> | Tm<br>INLET °F | Tm<br>OUTLET °F | OVEN<br>TEMP.<br>°F | IMP.<br>OUTLET<br>TEMP. °F | VACUUM<br>(in Hg) |
|----|------|--|----------|---------------------------|-------|---------------------------|-----------------------|----------------|-----------------|---------------------|----------------------------|-------------------|
| 1  | 0    | 1.56                                       | 102      | .57                       | .77   | 846.63                    | 50                    | 48             | 251             | 39                  | 10                         |                   |
| 2  | 2.5  |  | 103      | .56                       | .74   | 847.9                     | 50                    | 49             | 253             | 40                  | 10                         |                   |
| 3  | 5    |  | 104      | .55                       | .72   | 849.8                     | 50                    | 49             | 256             | 40                  | 11                         |                   |
| 4  | 7.5  |  | 104      | .52                       | .68   | 851.6                     | 51                    | 49             | 250             | 41                  | 11                         |                   |
| 5  | 10   |  | 104      | .48                       | .64   | 853.2                     | 52                    | 50             | 253             | 41                  | 11                         |                   |
| 6  | 12.5 |  | 105      | .67                       | .90   | 855.1                     | 54                    | 50             | 255             | 41                  | 11                         |                   |
| 7  | 15   |  | 105      | .64                       | .86   | 857.2                     | 54                    | 50             | 261             | 42                  | 11                         |                   |
| 8  | 17.5 |  | 105      | .73                       | 1.01  | 859.1                     | 55                    | 51             | 263             | 42                  | 11                         |                   |
| 9  | 20   |  | 108      | .64                       | .86   | 861.3                     | 55                    | 51             | 267             | 42                  | 11                         |                   |
| 10 | 22.5 |  | 106      | .50                       | .66   | 863.3                     | 56                    | 52             | 263             | 42                  | 11                         |                   |
| 11 | 25   |  | 107      | .47                       | .62   | 865.0                     | 56                    | 52             | 260             | 43                  | 11                         |                   |
| 12 | 27.5 |  | 107      | .44                       | .59   | 866.7                     | 58                    | 54             | 263             | 43                  | 11                         |                   |
| 13 | 30   |  | 102      | .70                       | .98   | 868.4                     | 62                    | 56             | 261             | 43                  | 11                         |                   |
| 14 | 32.5 |  | 102      | .74                       | 1.06  | 870.5                     | 64                    | 60             | 258             | 43                  | 11                         |                   |
| 15 | 35   |  | 107      | .75                       | 1.08  | 872.6                     | 66                    | 62             | 270             | 44                  | 11                         |                   |
| 16 | 37.5 |  | 107      | .78                       | 1.10  | 874.8                     | 66                    | 62             | 268             | 44                  | 11                         |                   |
| 17 | 40   |  | 106      | .75                       | 1.08  | 877.1                     | 68                    | 64             | 268             | 44                  | 11                         |                   |
| 18 | 42.5 |  | 107      | .68                       | .98   | 879.2                     | 72                    | 68             | 269             | 44                  | 11                         |                   |
| 19 | 45   |  | 107      | .70                       | 1.03  | 881.4                     | 74                    | 68             | 270             | 40                  | 11                         |                   |
| 20 | 47.5 |  | 105      | .68                       | 1.01  | 883.5                     | 76                    | 70             | 269             | 40                  | 11                         |                   |
| 21 | 50   |  | 105      | .66                       | .98   | 885.7                     | 76                    | 70             | 268             | 40                  | 11                         |                   |
| 22 | 52.5 |  | 107      | .68                       | 1.01  | 887.4                     | 78                    | 72             | 266             | 40                  | 11                         |                   |
| 23 | 55   |  | 107      | .50                       | .72   | 889.9                     | 78                    | 77             | 265             | 40                  | 11                         |                   |
| 24 | 57.5 |  | 106      | .48                       | .68   | 891.7                     | 78                    | 72             | 266             | 40                  | 11                         |                   |
| AV | 60   | 1.56                                       | 105.33   | .6151                     | .7843 | 8650                      | 893.502               | 60.4           |                 |                     |                            |                   |

TIME END = 10:55 AM

47.399

POST TEST LEAK CHECKS  
 METER 0.0 @ 25 in. Hg  
 PITOTS 0 @ 4 in. H<sub>2</sub>O  
 ORSAT OK

| VOLUME OF LIQUID WATER COLLECTED | IMPINGER VOLUME ml |     |   |   | SILICA GEL WEIGHT |
|----------------------------------|--------------------|-----|---|---|-------------------|
|                                  | 1                  | 2   | 3 | 4 |                   |
| FINAL                            | 150                | 123 |   |   | 216.5             |
| INITIAL                          | 100                | 100 |   |   | 200               |
| LIQUID COLLECTED                 |                    |     |   |   | (16.5)            |
| TOTAL VOLUME COLLECTED           |                    |     |   |   |                   |

| ORSAT MEASUREMENT | TIME | CO <sub>2</sub> | O <sub>2</sub> | CO | N <sub>2</sub> |
|-------------------|------|-----------------|----------------|----|----------------|
| 1                 |      | 0.0             | 20.5           |    |                |
| 2                 |      |                 |                |    |                |
| 3                 |      |                 |                |    |                |
| 4                 |      |                 |                |    |                |

# The Omega Corporation

## PARTICULATE ANALYTICAL DATA FORM

COMPANY: AMERICAN MAIZE STACK NUMBER: \_\_\_\_\_  
LOCATION: CHICAGO RUN NUMBER: 1  
DATE: 4/12/93 RELATIVE HUMIDITY: 50 %  
ACETONE DENSITY (Pa): 7853 g/l

LIQUID LEVEL MARKED AND CONTAINER SEALED?   
ACETONE BLANK RESIDUE CONCENTRATION (Ca) \_\_\_\_\_ mg  
ACETONE RINSE VOLUME (Vaw) \_\_\_\_\_ ml  
BLANK RESIDUE IN ACETONE RINSE (Wa) = Ca.Vaw.Pa = \_\_\_\_\_ mg

NOTE: IN NO CASE SHOULD A BLANK RESIDUE 0.01 mg/g OR 0.001 % OF THE WEIGHT OF ACETONE USED BE SUBTRACTED FROM THE SAMPLE WEIGHT.

DATE OF WEIGHING 4/16/93 GROSS WT. 103210.0 mg  
TIME OF WEIGHING 8:00  
DATE OF WEIGHING 4/16/93 GROSS WT. 103210.1 mg  
TIME OF WEIGHING 14:00

AVERAGE GROSS WT. 103210.0 mg

LESS BLANK RESIDUE (Wa) \_\_\_\_\_ mg

TARE WT. 103136.9 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 73.1 mg

DATE OF WEIGHING 4/16/93 GROSS FILTER WT. 608.7 mg  
TIME OF WEIGHING 8:00  
DATE OF WEIGHING 4/16/93 GROSS FILTER WT. 608.7 mg  
TIME OF WEIGHING 14:00

AVERAGE GROSS WT. 608.8 mg

FILTER TARE WT. 602.0 mg

WEIGHT OF PARTICULATE ON FILTER 6.8 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 73.1 mg

TOTAL WEIGHT OF PARTICULATE 79.9 mg

REMARKS: \_\_\_\_\_

INITIALS OF ANALYST \_\_\_\_\_

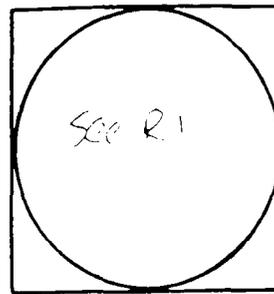
# PARTICULATE FIELD DATA

PLANT American MAZC  
 DATE 4-28-93  
 LOCATION Hammond IN  
 OPERATOR LF MR Buzz  
 STACK NO. #4 Dryer  
 RUN NO. R2 RIMS  
 SAMPLE BOX NO. # 3  
 METER BOX NO. #3  
 METER ΔH @ 7524  
 Y = 1.0085  
 TIME START = 11:28 AM

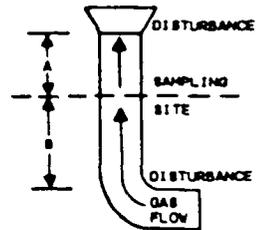
AMBIENT TEMPERATURE 45  
 BAROMETRIC PRESSURE 29.70  
 ASSUMED MOISTURE, % 8  
 PROBE LENGTH, in. 6' off  
 NOZZLE DIAMETER, in. .250 .251 .249  
 STACK DIAMETER, in. 52"  
 PROBE HEATER SETTING 240 ± 25  
 HEATER BOX SETTING 240 ± 25  
 Δ Cp FACTOR .64  
 FILTER NO. 2407  
 FILTER TARE WEIGHT 1000.6 mg.

↑ NORTH

SCHEMATIC OF STACK



CROSS SECTION



PRE TEST LEAK CHECKS

METER 0.0 @ 26 in. Hg  
 PITOTS 0 @ 4 in. H<sub>2</sub>O  
 ORSAT OK

| P   | θ    | STATIC PRESSURE +/- in H <sub>2</sub> O | Ts °F | ΔP in H <sub>2</sub> O | √ΔP | ΔH in H <sub>2</sub> O | Vm ft <sup>3</sup> | Tm INLET °F | Tm OUTLET °F | OVEN TEMP. °F | IMP. OUTLET TEMP. °F | VACUUM (in Hg) |
|-----|------|---|-------|------------------------|-----|------------------------|--------------------|-------------|--------------|---------------|----------------------|----------------|
| 1   | 0    | 1.62                                    | 103   | .50                    |     | .64                    | 894.257            | 67          | 65           | 230           | 40                   | 8              |
| 2   | 2.5  |   | 110   | .53                    |     | .74                    | 896.2              | 69          | 67           | 238           | 40                   | 8              |
| 3   | 5    |   | 109   | .74                    |     | 1.08                   | 898.1              | 69          | 67           | 240           | 40                   | 8              |
| 4   | 7.5  |   | 109   | .76                    |     | 1.10                   | 900.5              | 70          | 68           | 241           | 40                   | 8              |
| 5   | 10   |   | 103   | .75                    |     | 1.10                   | 902.5              | 71          | 69           | 245           | 41                   | 8              |
| 6   | 12.5 |   | 104   | .77                    |     | 1.14                   | 904.7              | 72          | 70           | 248           | 41                   | 8              |
| 7   | 15   |   | 106   | .71                    |     | 1.03                   | 906.9              | 72          | 70           | 251           | 41                   | 8              |
| 8   | 17.5 |   | 109   | .68                    |     | .98                    | 909.1              | 72          | 70           | 255           | 41                   | 8              |
| 9   | 20   |   | 108   | .73                    |     | 1.08                   | 911.2              | 75          | 71           | 258           | 42                   | 8              |
| 10  | 22.5 |   | 108   | .78                    |     | 1.16                   | 913.4              | 75          | 71           | 260           | 42                   | 8              |
| 11  | 25   |   | 108   | .68                    |     | 1.01                   | 915.7              | 76          | 72           | 263           | 42                   | 8              |
| 12  | 27.5 |   | 109   | .67                    |     | .98                    | 917.8              | 77          | 73           | 260           | 42                   | 8              |
| 13  | 30   |   | 103   | .42                    |     | .60                    | 919.9              | 77          | 73           | 263           | 42                   | 8              |
| 14  | 32.5 |   | 104   | .67                    |     | 1.01                   | 921.6              | 78          | 74           | 261           | 42                   | 8              |
| 15  | 35   |   | 105   | .72                    |     | 1.08                   | 923.7              | 78          | 74           | 260           | 41                   | 8              |
| 16  | 37.5 |   | 104   | .64                    |     | .96                    | 925.9              | 78          | 74           | 262           | 41                   | 8              |
| 17  | 40   |   | 107   | .65                    |     | .96                    | 928.0              | 78          | 74           | 262           | 41                   | 8              |
| 18  | 42.5 |   | 106   | .78                    |     | 1.06                   | 938.1              | 80          | 74           | 262           | 40                   | 8              |
| 19  | 45   |   | 110   | .70                    |     | 1.06                   | 932.3              | 80          | 75           | 262           | 40                   | 8              |
| 20  | 47.5 |   | 112   | .64                    |     | .96                    | 934.4              | 82          | 77           | 263           | 40                   | 8              |
| 21  | 50   |   | 112   | .60                    |     | .98                    | 936.5              | 82          | 78           | 260           | 40                   | 8              |
| 22  | 52.5 |   | 113   | .70                    |     | 1.06                   | 938.6              | 82          | 78           | 260           | 40                   | 8              |
| 23  | 55   |   | 114   | .67                    |     | 1.01                   | 940.8              | 82          | 78           | 260           | 40                   | 8              |
| 24  | 57.5 |   | 113   | .50                    |     | .72                    | 942.9              | 82          | 78           | 256           | 40                   | 8              |
| Avg | 60   | 4.62                                    | 108.0 | .66575                 |     | .8159                  | 944.755            |             | 74.25        |               |                      |                |

TIME END - 12:31 PM

POST TEST LEAK CHECKS

METER 0.0 @ 26 in. Hg  
 PITOTS 0 @ 4 in. H<sub>2</sub>O  
 ORSAT OK

| VOLUME OF LIQUID WATER COLLECTED | IMPINGER VOLUME ml |     |   |   | SILICA GEL WEIGHT |
|----------------------------------|--------------------|-----|---|---|-------------------|
|                                  | 1                  | 2   | 3 | 4 |                   |
| FINAL                            | 150                | 132 |   |   | 219.0             |
| INITIAL                          | 100                | 100 |   |   | 200               |
| LIQUID COLLECTED                 |                    |     |   |   | (19)              |
| TOTAL VOLUME COLLECTED           |                    |     |   |   |                   |

| ORSAT MEASUREMENT | TIME | CO <sub>2</sub> | O <sub>2</sub> | CO | H <sub>2</sub> |
|-------------------|------|-----------------|----------------|----|----------------|
| 1                 |      | 0.0             | 20.0           |    |                |
| 2                 |      |                 |                |    |                |
| 3                 |      |                 |                |    |                |

# The Almega Corporation

## PARTICULATE ANALYTICAL DATA FORM

COMPANY: American MAIZE STACK NUMBER: \_\_\_\_\_  
LOCATION: CHICAGO RUN NUMBER: 2  
DATE: 4/12/93 RELATIVE HUMIDITY: 50 %  
ACETONE DENSITY (Pa): .7853 g/ml

LIQUID LEVEL MARKED AND CONTAINER SEALED?   
ACETONE BLANK RESIDUE CONCENTRATION (Ca) \_\_\_\_\_ mg/g  
ACETONE RINSE VOLUME (Vaw) \_\_\_\_\_ ml  
BLANK RESIDUE IN ACETONE RINSE (Wa) = Ca.Vaw.Pa = \_\_\_\_\_ mg

NOTE: IN NO CASE SHOULD A BLANK RESIDUE 0.01 mg/g OR 0.001 % OF THE WEIGHT OF ACETONE USED BE SUBTRACTED FROM THE SAMPLE WEIGHT.

DATE OF WEIGHING 4/16/93 GROSS WT. 112039.5 mg  
TIME OF WEIGHING 8.00  
DATE OF WEIGHING 4/16/93 GROSS WT. 112039.9 mg  
TIME OF WEIGHING 14.00

AVERAGE GROSS WT. 112039.7 mg

LESS BLANK RESIDUE (Wa) \_\_\_\_\_ mg

TARE WT. 112004.1 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 35.6 mg

DATE OF WEIGHING 4/16/93 GROSS FILTER WT. 606.0 mg  
TIME OF WEIGHING 8.00  
DATE OF WEIGHING 4/16/93 GROSS FILTER WT. 606.3 mg  
TIME OF WEIGHING 14.00

AVERAGE GROSS WT. 606.1 mg

FILTER TARE WT. 600.6 mg

WEIGHT OF PARTICULATE ON FILTER 5.5 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 35.6 mg

TOTAL WEIGHT OF PARTICULATE 40.1 mg

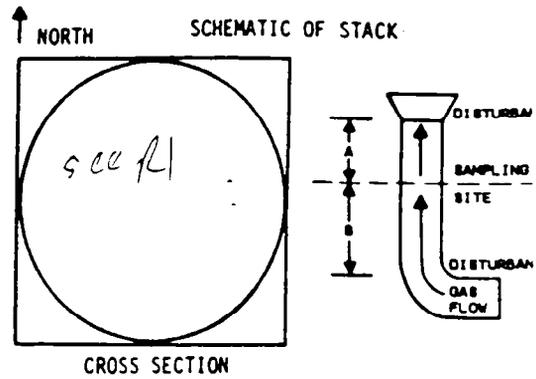
REMARKS: \_\_\_\_\_

INITIALS OF ANALYST \_\_\_\_\_

# PARTICULATE FIELD DATA

PLANT American WARE  
 DATE 4-13-93  
 LOCATION Hammond IN  
 OPERATOR LF MR Buzz  
 STACK NO. #4 Dryer  
 RUN NO. R3 RMS  
 SAMPLE BOX NO. #1  
 METER BOX NO. #2  
 METER ΔH @ 7524  
 Y = 1.0085  
 TIME START = 1:09

AMBIENT TEMPERATURE 75  
 BAROMETRIC PRESSURE 29.70  
 ASSUMED MOISTURE, % 0  
 PROBE LENGTH, in. 6' off  
 NOZZLE DIAMETER, in. .251 .249 .250  
 STACK DIAMETER, in. 52"  
 PROBE HEATER SETTING 248 ± 25  
 HEATER BOX SETTING 248 ± 25  
 Δ Cp FACTOR .84  
 FILTER NO. 896  
 FILTER TARE WEIGHT 602.7 mg.



### PRE TEST LEAK CHECKS

METER .002 @ 25 in. Hg  
 PITOTS 0 @ 4 in. H<sub>2</sub>O  
 ORSAT OK

| P  | θ  | STATIC PRESSURE<br>± in. H <sub>2</sub> O | Ts<br>°F | ΔP<br>in. H <sub>2</sub> O | √ΔP      | ΔH<br>in. H <sub>2</sub> O | Vm<br>ft <sup>3</sup> | Tm<br>INLET °F | Tm<br>OUTLET °F | OVEN<br>TEMP.<br>°F | IMP.<br>OUTLET<br>TEMP. °F | VACUUM<br>(in. Hg) |
|----|----|---|----------|----------------------------|----------|----------------------------|-----------------------|----------------|-----------------|---------------------|----------------------------|--------------------|
| 1  | 0  | +.62                                      | 112      | .60                        | .84      | 946.880                    | 70                    | 68             | 248             | 38                  | 11                         |                    |
| 2  |    |   | 115      | .63                        | .90      | 948.9                      | 71                    | 69             | 255             | 39                  | 11                         |                    |
| 3  | 5  |   | 114      | .68                        | .98      | 950.9                      | 72                    | 70             | 258             | 39                  | 11                         |                    |
| 4  |    |   | 114      | .59                        | .86      | 953.0                      | 75                    | 71             | 260             | 39                  | 11                         |                    |
| 5  | 10 |   | 113      | .61                        | .88      | 954.4                      | 76                    | 77             | 261             | 39                  | 9                          |                    |
| 6  |    |   | 114      | .63                        | .90      | 956.9                      | 76                    | 72             | 260             | 40                  | 9                          |                    |
| 7  | 15 |   | 111      | .58                        | .86      | 958.6                      | 78                    | 72             | 257             | 40                  | 9                          |                    |
| 8  |    |   | 112      | .52                        | .74      | 960.9                      | 78                    | 74             | 258             | 40                  | 9                          |                    |
| 9  | 20 |   | 118      | .48                        | .68      | 962.7                      | 78                    | 74             | 260             | 40                  | 9                          |                    |
| 10 |    |   | 116      | .46                        | .66      | 964.5                      | 79                    | 75             | 260             | 41                  | 9                          |                    |
| 11 | 25 |   | 108      | .46                        | .66      | 966.3                      | 79                    | 75             | 264             | 40                  | 9                          |                    |
| 12 |    |   | 106      | .42                        | .60      | 968.1                      | 79                    | 75             | 263             | 40                  | 9                          |                    |
| 1  | 30 |   | 114      | .64                        | .96      | 969.8                      | 80                    | 76             | 262             | 41                  | 9                          |                    |
| 2  |    |   | 114      | .58                        | .86      | 971.8                      | 80                    | 76             | 261             | 40                  | 9                          |                    |
| 3  | 35 |   | 111      | .60                        | .86      | 973.8                      | 80                    | 76             | 266             | 40                  | 9                          |                    |
| 4  |    |   | 111      | .60                        | .88      | 975.8                      | 81                    | 77             | 258             | 40                  | 9                          |                    |
| 5  | 40 |   | 113      | .72                        | 1.03     | 977.8                      | 81                    | 77             | 259             | 40                  | 9                          |                    |
| 6  |    |   | 113      | .68                        | 1.03     | 980.7                      | 81                    | 78             | 258             | 40                  | 9                          |                    |
| 7  | 45 |   | 112      | .70                        | 1.06     | 982.8                      | 82                    | 78             | 256             | 40                  | 9                          |                    |
| 8  |    |   | 113      | .71                        | 1.06     | 984.3                      | 82                    | 78             | 253             | 41                  | 9                          |                    |
| 9  | 50 |   | 114      | .75                        | 1.14     | 986.5                      | 82                    | 78             | 252             | 41                  | 9                          |                    |
| 10 |    |   | 114      | .62                        | .94      | 988.7                      | 82                    | 78             | 250             | 41                  | 9                          |                    |
| 11 | 55 |   | 109      | .51                        | .74      | 990.8                      | 82                    | 78             | 247             | 41                  | 9                          |                    |
| 12 |    |   | 102      | .45                        | .66      | 992.6                      | 82                    | 78             | 241             | 40                  | 9                          |                    |
| AV | 60 | (+.62)                                    | (112.0)  | (.5889)                    | (.76739) | (968.75)                   | (76.386)              | (76.75)        |                 |                     |                            |                    |

TIME END = 2:11 PM

47.506

### POST TEST LEAK CHECKS

METER 0.0 @ 25 in. Hg  
 PITOTS 0 @ 4 in. H<sub>2</sub>O  
 ORSAT OK

| VOLUME OF LIQUID WATER COLLECTED | IMPINGER VOLUME ml |     |   |   | SILICA GEL WEIGHT |
|----------------------------------|--------------------|-----|---|---|-------------------|
|                                  | 1                  | 2   | 3 | 4 |                   |
| FINAL                            | 145                | 135 |   |   | 215.5             |
| INITIAL                          | 100                | 106 |   |   | 200               |
| LIQUID COLLECTED                 |                    |     |   |   |                   |
| TOTAL VOLUME COLLECTED           |                    |     |   |   | (95.9)            |

| ORSAT MEASUREMENT | TIME | CO  | O   | CO | N |
|-------------------|------|-----|-----|----|---|
| 1                 |      | 5.0 | 2.0 |    |   |
| 2                 |      |     |     |    |   |
| 3                 |      |     |     |    |   |
| 4                 |      |     |     |    |   |

# The ALMEGA CORPORATION

## PARTICULATE ANALYTICAL DATA FORM

COMPANY: American MAIZE STACK NUMBER: \_\_\_\_\_  
LOCATION: Chicago RUN NUMBER: 3  
DATE: 4/12/93 RELATIVE HUMIDITY: 50 %  
ACETONE DENSITY (Pa): .7853 g/ml  
LIQUID LEVEL MARKED AND CONTAINER SEALED?   
ACETONE BLANK RESIDUE CONCENTRATION (Ca) \_\_\_\_\_ mg/l  
ACETONE RINSE VOLUME (Vaw) \_\_\_\_\_ ml  
BLANK RESIDUE IN ACETONE RINSE (Wa) = Ca.Vaw.Pa = \_\_\_\_\_ mg

NOTE: IN NO CASE SHOULD A BLANK RESIDUE 0.01 mg/g OR 0.001 % OF THE WEIGHT OF ACETONE USED BE SUBTRACTED FROM THE SAMPLE WEIGHT.

DATE OF WEIGHING 4/12/93 GROSS WT. 104715.1 mg

TIME OF WEIGHING 8:00

DATE OF WEIGHING 4/12/93 GROSS WT. 104715.1 mg

TIME OF WEIGHING 14:00

AVERAGE GROSS WT. 104715.1 mg

LESS BLANK RESIDUE (Wa) \_\_\_\_\_ mg

TARE WT. 104693.0 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 22.1 mg

DATE OF WEIGHING 4/12/93 GROSS FILTER WT. 617.0 mg

TIME OF WEIGHING 8:00

DATE OF WEIGHING 4/12/93 GROSS FILTER WT. 617.4 mg

TIME OF WEIGHING 14:00

AVERAGE GROSS WT. 617.2 mg

FILTER TARE WT. 602.7 mg

WEIGHT OF PARTICULATE ON FILTER 14.5 mg

WEIGHT OF PARTICULATE IN ACETONE RINSE 22.1 mg

TOTAL WEIGHT OF PARTICULATE 36.6 mg

REMARKS: \_\_\_\_\_

INITIALS OF ANALYST \_\_\_\_\_

# The Almega Corporation

## PARTICULATE ANALYTICAL DATA FORM

COMPANY: American MAIZE STACK NUMBER: \_\_\_\_\_  
LOCATION: CHICAGO RUN NUMBER: BLANK  
DATE: 4/12/93 RELATIVE HUMIDITY: 50 %  
ACETONE DENSITY (Pa): .7853 g/ml  
LIQUID LEVEL MARKED AND CONTAINER SEALED?   
ACETONE BLANK RESIDUE CONCENTRATION (Ca) \_\_\_\_\_ mg/l  
ACETONE RINSE VOLUME (Vaw) \_\_\_\_\_ ml  
BLANK RESIDUE IN ACETONE RINSE (Wa) = Ca.Vaw.Pa = \_\_\_\_\_ mg

NOTE: IN NO CASE SHOULD A BLANK RESIDUE 0.01 mg/g OR 0.001 % OF THE WEIGHT OF ACETONE USED BE SUBTRACTED FROM THE SAMPLE WEIGHT.

7516  
DATE OF WEIGHING 4/12/93 GROSS WT. 107606.8 mg  
TIME OF WEIGHING 8:00  
DATE OF WEIGHING 4/12/93 GROSS WT. 107606.8 mg  
TIME OF WEIGHING 14:00  
AVERAGE GROSS WT. 107606.8 mg  
LESS BLANK RESIDUE (Wa) \_\_\_\_\_ mg  
TARE WT. 107606.8 mg  
WEIGHT OF PARTICULATE IN ACETONE RINSE 0.0 mg  
DATE OF WEIGHING \_\_\_\_\_ GROSS FILTER WT. \_\_\_\_\_ mg  
TIME OF WEIGHING \_\_\_\_\_  
DATE OF WEIGHING \_\_\_\_\_ GROSS FILTER WT. \_\_\_\_\_ mg  
TIME OF WEIGHING \_\_\_\_\_  
AVERAGE GROSS WT. \_\_\_\_\_ mg  
FILTER TARE WT. \_\_\_\_\_ mg  
WEIGHT OF PARTICULATE ON FILTER \_\_\_\_\_ mg  
WEIGHT OF PARTICULATE IN ACETONE RINSE \_\_\_\_\_ mg  
TOTAL WEIGHT OF PARTICULATE \_\_\_\_\_ mg

REMARKS: \_\_\_\_\_

INITIALS OF ANALYST \_\_\_\_\_





# American Maize Process Data

#4 Starch Dryer      Product PFP      April 13, 1993

|                          |              |           |                     |
|--------------------------|--------------|-----------|---------------------|
| Test 1                   | Start 9:45   | End 10:45 | Total Baskets<br>10 |
| Scrubber Water Flow Rate | 370 g.p.m.   |           |                     |
| Scrubber Pressure Drop   | 6.75 " water |           |                     |
| pH of Scrubber Water     | 5.37         |           |                     |
| Operating Load #4 Dryer  | 19,000 lb/hr |           |                     |

|                          |              |           |                     |
|--------------------------|--------------|-----------|---------------------|
| Test 2                   | Start 11:30  | End 12:30 | Total Baskets<br>11 |
| Scrubber Water Flow Rate | 380 g.p.m.   |           |                     |
| Scrubber Pressure Drop   | 9.75 " water |           |                     |
| pH of Scrubber Water     | 4.71         |           |                     |
| Operating Load #4 Dryer  | 20,900 lb/hr |           |                     |

|                          |               |          |                     |
|--------------------------|---------------|----------|---------------------|
| Test 3                   | Start 1:09    | End 2:09 | Total Baskets<br>10 |
| Scrubber Water Flow Rate | 370 g.p.m.    |          |                     |
| Scrubber Pressure Drop   | 11.25 " water |          |                     |
| pH of Scrubber Water     | 4.65          |          |                     |
| Operating Load #4 Dryer  | 19,000 lb/hr  |          |                     |

# **THE ALMEGA CORPORATION**

## **APPENDIX G**

**COPIES OF EQUIPMENT CALIBRATIONS AND SAMPLE CHAIN-OF-CUSTODY**

POSTTEST DRY GAS METER CALIBRATION DATA FORM (English Units)

TEST NUMBER 2 DATE 4-13-93 METER BOX NUMBER 3 PLANT American Maize  
 BAROMETRIC PRESSURE,  $P_b$  = 28.89 in. Hg DRY GAS METER NUMBER 25075 PRETEST Y 1.0085

| Orifice<br>meter<br>setting<br>( $\Delta H$ )<br>in. H <sub>2</sub> O | GAS VOLUME  |  | TEMPERATURE                        |                            |                             |                          | Time<br>( $\theta$ )<br>min | Vacuum<br>Setting<br>in. Hg | $Y_i$ | $\frac{V_w P_b Y_i (t_d + 460)}{V_d (P_b + \frac{\Delta H}{13.6})(t_w + 460)}$ |
|---|---|--|------------------------------------|----------------------------|-----------------------------|--------------------------|-----------------------------|-----------------------------|-------|--|
|   | Reference<br>Test Meter<br>( $V_w$ ), ft <sup>3</sup> | Dry Gas<br>Meter<br>( $V_d$ ), ft <sup>3</sup> | Reference<br>Test<br>( $t_w$ ), °F | DRY GAS METER              |                             |                          |                             |                             |       |  |
|   |   |  |                                    | Inlet<br>( $t_{d_i}$ ), °F | Outlet<br>( $t_{d_o}$ ), °F | Average<br>( $t_d$ ), °F |                             |                             |       |  |
| 78  | 266.934   | 000.309  | 66°                                | 70°                        | 70°                         | 70°                      | 5                           | 11"                         |       | 1.0428   |
| 78  | 271.181   | 004.401  | 67°                                | 75°                        | 78°                         | 76.5                     | 5                           | 13"                         |       | .981   |
| 98  | 275.477   | 008.797  | 67°                                | 79°                        | 80°                         | 79.5                     |                             |                             |       | 1.0101   |
|   |   |  |                                    |                            |                             |                          |                             |                             |       | $Y = 1.0114$   |

$V_w$  4.247 | 4.296 | 4.198  
 $V_d$  4.092 | 4.396 | 4.240

\*If there is only one thermometer on the dry gas meter, record the temperature under  $t_d$ .

Where:

- $V_w$  = Gas volume passing through the reference test meter, ft<sup>3</sup>.
- $V_d$  = Gas volume passing through the dry gas meter, ft<sup>3</sup>.
- $t_w$  = Temperature of the gas in the reference test meter, °F.
- $t_{d_i}$  = Temperature of the inlet gas of the dry gas meter, °F.
- $t_{d_o}$  = Temperature of the outlet gas of the dry gas meter, °F.
- $t_d$  = Average temperature of the gas in the dry gas meter, obtained by the average of  $t_{d_i}$  and  $t_{d_o}$ , °F.
- $\Delta H$  = Pressure differential across orifice, in. H<sub>2</sub>O.
- $Y_i$  = Ratio of accuracy of reference test meter to dry gas meter for each run.
- $Y$  = Average ratio of accuracy of reference test meter to dry gas meter for all three runs; tolerance = pretest  $Y \pm 0.05Y$ .
- $P_b$  = Barometric pressure, in. Hg.
- $\theta$  = Time of calibration run, min.



# The ALMEGA CORPORATION

## MAGNEHELIC CALIBRATION DATA

Date: Dec. 13<sup>th</sup> 1992 Calibrated By: R.N.

Magnehelic #: ΔP M. Box #3 "w.g.

Magnehelic Range: 0" To 1.0" H<sub>2</sub>O "w.g.

## TEST READINGS

| <u>MAGNEHELIC</u> |      | <u>MANOMETER</u> |      |
|-------------------|------|------------------|------|
| Pos.              | Neg. | Pos.             | Neg. |
| .16               | .16  | .16              | .16  |
| .33               | .33  | .33              | .33  |
| .50               | .50  | .50              | .50  |
| .66               | .66  | .66              | .66  |
| .82               | .82  | .81              | .81  |
| 1.0               | 1.0  | .99              | .99  |

# The ALMEGA CORPORATION

## MAGNEHELIC CALIBRATION DATA

Date: Dec. 13<sup>th</sup> 1992

Calibrated By: R.N.

Magnehelic #: ΔH M. Box #3

"w.g.

Magnehelic Range: 0" To 3.0" H<sub>2</sub>O

"w.g.

### TEST READINGS

#### MAGNEHELIC

#### MANOMETER

| Pos. | Neg. | Pos. | Neg. |
|------|------|------|------|
| .5   | .5   | .5   | .5   |
| 1.0  | 1.0  | 1.0  | 1.0  |
| 1.5  | 1.5  | 1.5  | 1.5  |
| 2.0  | 2.0  | 2.0  | 2.0  |
| 2.6  | 2.6  | 2.7  | 2.7  |
| 3.0  | 3.0  | 3.04 | 3.04 |

# The Omega Corporation

## STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE Dec. 13<sup>th</sup> 1992 THERMOCOUPLE NUMBER Meter Box 3 Gas In and Out  
 AMBIENT TEMPERATURE 70 °F BAROMETRIC PRESSURE 30.22 in. Hg  
 CALIBRATOR R. Nowak REFERENCE: MERCURY-IN-GLASS Fisher Brand # 14-990-  
 OTHER \_\_\_\_\_

| REFERENCE POINT NUMBER <sup>a</sup> | SOURCE <sup>b</sup><br>(Specify)  | REFERENCE THERMOMETER TEMPERATURE, °F | THERMOCOUPLE POTENTIOMETER TEMPERATURE, °F | TEMPERATURE DIFFERENCE, % |
|-------------------------------------|-----------------------------------|---------------------------------------|--|---------------------------|
| Gas - In<br>↓                       | H <sub>2</sub> O - Ice            | 40°                                   | 39°  | .2%                       |
|                                     | H <sub>2</sub> O - Hot Plate<br>↓ | 60°                                   | 59°  | .19%                      |
|                                     |                                   | 80°                                   | 79°  | .18%                      |
|                                     |                                   | 100°                                  | 98°  | .35%                      |
|                                     |                                   | 120°                                  | 118°                                       | .34%                      |
|                                     |                                   | 140°                                  | 137°                                       | .5%                       |
| Gas - Out<br>↓                      | H <sub>2</sub> O - Ice            | 40°                                   | 38°  | .4%                       |
|                                     | H <sub>2</sub> O - Hot Plate<br>↓ | 60°                                   | 58°  | .38%                      |
|                                     |                                   | 80°                                   | 78°  | .37%                      |
|                                     |                                   | 100°                                  | 97°  | .53%                      |
|                                     |                                   | 120°                                  | 117°                                       | .51%                      |
|                                     |                                   | 140°                                  | 136°                                       | .66%                      |

<sup>a</sup> Every 50°F for each reference point.

<sup>b</sup> Type of calibration system used.

<sup>c</sup> 
$$\left[ \frac{(\text{ref temp, } ^\circ\text{F} + 460) - (\text{test thermom temp, } ^\circ\text{F} + 460)}{\text{ref temp, } ^\circ\text{F} + 460} \right] 100 \leq 1.5\%$$

# THE ALMEGA CORPORATION

## TYPE S PITOT TUBE INSPECTION DATA FORM

Calibrated by: S. Miller  
Pitot Tube Number: 114  
Date: 1-19-93  
Manufacturer: ALMEGA Corp.  
Effective Length: 6<sup>FT</sup>

Pitot tube assembly level?  Yes  No

Pitot tube openings damaged?  Yes (explain below)  No

$\alpha_1 =$  1 ° (<10°),  $\alpha_2 =$  1 ° (<10°),

$\beta_1 =$  1 ° (< 5°),  $\beta_2 =$  1 ° (< 5°)

$\gamma =$  1 °,  $\theta =$  2 °,  $A =$  .74 cm (in.)

$z = A \sin \gamma =$  .011 cm (in.); <0.32 cm (<1/8 in.),

$w = A \sin \theta =$  .023 cm (in.); <0.08 cm (<1/32 in.)

$P_A$  .37 cm (in.)  $P_b$  .37 cm (in.)

$D_t$  .25 cm (in.)

Comments: TAG ON "A"

Calibration required?  Yes  No

# The ALMEGA CORPORATION

## STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 1-6-93 THERMOCOUPLE NUMBER #1  
SAMPLE BOX (IMP OUT OVEN)  
 AMBIENT TEMPERATURE 71 °F BAROMETRIC PRESSURE 29.78 in. Hg.  
 CALIBRATOR T. LUNDIN REFERENCE: MERCURY-IN-GLASS   
 OTHER \_\_\_\_\_

| REFERENCE POINT NUMBER <sup>a</sup> | SOURCE <sup>b</sup> (Specify) | REFERENCE THERMOMETER TEMPERATURE, °F | THERMOCOUPLE POTENTIOMETER TEMPERATURE, °F | TEMPERATURE DIFFERENCE, % |      |
|-------------------------------------|-------------------------------|---------------------------------------|--|---------------------------|------|
| IMP OUT                             | H <sub>2</sub> O              | 45                                    | 46   | .019%                     |      |
|                                     |                               | 55                                    | 55   | .0%                       |      |
|                                     |                               | 65                                    | 63   | .38%                      |      |
|                                     | G.E. SILICON FLUID            | 75                                    | 75   | 0%                        |      |
|                                     |                               | 85                                    | 85   | 0%                        |      |
|                                     |                               | 95                                    | 93   | .36%                      |      |
|                                     |                               | 105                                   | 104  | .17%                      |      |
|                                     | OVEN                          | H <sub>2</sub> O ICE                  | 45   | 45                        | 0%   |
|                                     |                               |                                       | 55   | 55                        | 0%   |
|                                     |                               |                                       | 65   | 64                        | .19% |
| 75                                  |                               |                                       | 76   | -.18%                     |      |
| G.E. SILICON FLUID                  |                               | 80                                    | 81   | -.18%                     |      |
|                                     |                               | 90                                    | 90   | 0%                        |      |
|                                     |                               | 100                                   | 100  | 0%                        |      |
|                                     |                               | 150                                   | 149  | .16%                      |      |
|                                     |                               | 200                                   | 199  | .15%                      |      |
|                                     |                               | 250                                   | 248  | .28%                      |      |
| 300                                 | 301                           | .13%                                  |  |                           |      |

<sup>a</sup> Every 50°F for each reference point.

<sup>b</sup> Type of calibration system used.

<sup>c</sup> 
$$\left[ \frac{(\text{ref temp, } ^\circ\text{F} + 460) - (\text{test thermom temp, } ^\circ\text{F} + 460)}{\text{ref temp, } ^\circ\text{F} + 460} \right] 100 < 1.5\%$$

# The Almega Corporation

## STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

DATE 1-6-93

THERMOCOUPLE NUMBER SAMPLE BOX # 31 (OVEN/IMP OUT)

AMBIENT TEMPERATURE 71 °F

BAROMETRIC PRESSURE 29.78 in. Hg.

CALIBRATOR T. LUNDIN

REFERENCE: MERCURY-IN-GLASS

OTHER \_\_\_\_\_

| REFERENCE POINT NUMBER <sup>a</sup> | SOURCE <sup>b</sup> (Specify) | REFERENCE THERMOMETER TEMPERATURE, °F | THERMOCOUPLE POTENTIOMETER TEMPERATURE, °F | TEMPERATURE DIFFERENCE, % |
|-------------------------------------|-------------------------------|---------------------------------------|--|---------------------------|
| IMP<br>OUT                          | H <sub>2</sub> O ICE BATH     | 45 <sup>o</sup> F                     | 45 <sup>o</sup> F                          | 0%                        |
|                                     |                               | 55                                    | 55   | 0%                        |
|                                     |                               | 65                                    | 66   | -.19%                     |
|                                     | G.E. SILICON FLUID            | 75 <sup>o</sup> F                     | 75 <sup>o</sup> F                          | 0%                        |
|                                     |                               | 85                                    | 85   | 0%                        |
|                                     |                               | 95                                    | 93   | .36%                      |
|                                     |                               | 105                                   | 104  | .17%                      |
| OVEN                                | H <sub>2</sub> O ICE          | 45 <sup>o</sup> F                     | 44 <sup>o</sup> F                          | .20%                      |
|                                     |                               | 55                                    | 55   | 0%                        |
|                                     |                               | 65                                    | 64   | .19%                      |
|                                     |                               | 75                                    | 73   | .37%                      |
|                                     | G.E. SILICON FLUID            | 80 <sup>o</sup> F                     | 80 <sup>o</sup> F                          | 0%                        |
|                                     |                               | 90                                    | 90   | 0%                        |
|                                     |                               | 100                                   | 103  | -.53%                     |
|                                     |                               | 150                                   | 151  | -.16%                     |
|                                     |                               | 200                                   | 199  | .15%                      |
|                                     |                               | 250                                   | 249  | .14%                      |
|                                     |                               | 300                                   | 302  | -.26%                     |

<sup>a</sup> Every 50°F for each reference point.

<sup>b</sup> Type of calibration system used.

<sup>c</sup>  $\left[ \frac{(\text{ref temp, } ^\circ\text{F} + 460) - (\text{test thermom temp, } ^\circ\text{F} + 460)}{(\text{ref temp, } ^\circ\text{F} + 460)} \right] \times 100 \leq 1.5\%$

# The ALMEGA CORPORATION

## STACK TEMPERATURE SENSOR CALIBRATION DATA FORM

Sample Box #17

DATE 3/3/93 THERMOCOUPLE NUMBER IMPINGERS IN/OUT

AMBIENT TEMPERATURE 70 °F BAROMETRIC PRESSURE 30.40 in. Hg

CALIBRATOR C.L. REFERENCE: MERCURY-IN-GLASS Yes

OTHER G.E. Silicon Fluid /  w/ m.z.#s

| REFERENCE POINT NUMBER <sup>a</sup> | SOURCE <sup>b</sup><br>(Specify) | REFERENCE THERMOMETER TEMPERATURE, °F | THERMOCOUPLE POTENTIOMETER TEMPERATURE, °F | TEMPERATURE DIFFERENCE, % |
|-------------------------------------|----------------------------------|---------------------------------------|--|---------------------------|
| IMPINGER<br>IN<br>↓                 | H <sub>2</sub> O<br>↓            | 40 °F                                 | 42 °F                                      | -0.40%                    |
|                                     |                                  | 50                                    | 52   | -0.39%                    |
|                                     |                                  | 60                                    | 60   | 0.0%                      |
|                                     | G.E. Silicon<br>Fluid<br>↓       | 70                                    | 71   | -0.18%                    |
|                                     |                                  | 80                                    | 81   | -0.18%                    |
|                                     |                                  | 90                                    | 90   | 0.0%                      |
|                                     |                                  | 100                                   | 102  | -0.35%                    |
|                                     |                                  | 100                                   | 102  | -0.35%                    |
| IMPINGER<br>OUT<br>↓                | H <sub>2</sub> O<br>↓            | 40                                    | 38   | .40%                      |
|                                     |                                  | 50                                    | 48   | .39%                      |
|                                     |                                  | 60                                    | 57   | .57%                      |
|                                     | G.E. Silicon<br>Fluid<br>↓       | 70                                    | 67   | .56%                      |
|                                     |                                  | 80                                    | 79   | .18%                      |
|                                     |                                  | 90                                    | 86   | .72%                      |
|                                     |                                  | 100                                   | 97   | .53%                      |
|                                     |                                  | 100                                   | 97   | .53%                      |

<sup>a</sup> Every 50°F for each reference point.

<sup>b</sup> Type of calibration system used.

<sup>c</sup> 
$$\left[ \frac{(\text{ref temp, } ^\circ\text{F} + 460) - (\text{test thermom temp, } ^\circ\text{F} + 460)}{\text{ref temp } ^\circ\text{F} + 460} \right] \times 100 \leq 1.5\%$$

# The ALMEGA CORPORATION

601-A Country Club Drive  
 Bensenville, Illinois 60106  
 Phone: (708) 595-0175  
 Fax: (708) 595-2103

## CHAIN OF CUSTODY RECORD

Date 4-15-93 Page 1 of 1

Project Number I-7231

SOURCE AMERICAN MAIZE

TEST DATE 4-13-93

PROJECT MANAGER

Larry Fisher

PHONE NUMBER

Method of Shipment

| Sample No. or Identification | Date | Time         | Lab Sample Number | Type of Sample |     |       | Number of Containers | ANALYSES |                        |  |  |  | Sample Condition/REMARKS |  |
|------------------------------|------|--------------|-------------------|----------------|-----|-------|----------------------|----------|------------------------|--|--|--|--------------------------|--|
|                              |      |              |                   | LIQ            | AIR | SOLID |                      | BML-5    | TDS - Suspended Solids |  |  |  |                          |  |
| PW RUN #1 3138               | 4/13 | 0945<br>1055 |                   | X              |     |       | X                    |          |                        |  |  |  |                          |  |
| PW RUN #2 3105               | 4/13 | 1128<br>1221 |                   | X              |     |       | X                    |          |                        |  |  |  |                          |  |
| PW RUN #3 3153               | 4/13 | 1809<br>1411 |                   | X              |     |       | X                    |          |                        |  |  |  |                          |  |
| MF RUN #1 923                | 4/13 | 0945<br>1055 |                   |                |     | X     | X                    |          |                        |  |  |  |                          |  |
| MF RUN #2 2407               | 4/13 | 1128<br>1231 |                   |                |     | X     | X                    |          |                        |  |  |  |                          |  |
| MF RUN #3 896                | 4/13 | 1309<br>1411 |                   |                |     | X     | X                    |          |                        |  |  |  |                          |  |
| ACETONE BLANK FHW #3113      | 4/13 | 1400         |                   | X              |     |       | X                    |          |                        |  |  |  |                          |  |
| TEST 1                       |      |              |                   |                |     |       |                      | X        |                        |  |  |  |                          |  |
| TEST 2                       |      |              |                   |                |     |       |                      | X        |                        |  |  |  |                          |  |
| TEST 3                       |      |              |                   |                |     |       |                      | X        |                        |  |  |  |                          |  |

SAMPLERS: (Signature)

Scott R Miller

Relinquished by: (Signature)

Scott R Miller

Relinquished by: (Signature)

Received by: (Signature)

Received by: (Signature)

Date Time

Received for Laboratory by:

Carol Miller

Date Time

Date Time

Date RECEIVED Time

4/15

Date ACCEPTED Time

9:00am

INDICATE SAMPLE DISPOSITION

1. Sample to be Returned to Client:

Yes  No  Other

2. Requested Sample Storage Time:

90 Days

Special Instructions

Measure TDS + suspended solids total liquid volume and give me mg/gals