AP-42 Section Number: 9.10.2.1

Reference Number: 11

Title: Emission Testing on Two Baghouses at Harris Woolf California Almonds

Steiner Environmental, Inc.

Steiner Environmental, Inc.

October 1992

AP-42 Section 9.10.2.1
Reference 11
Report Sect. ____
Reference ____

EMISSION TESTING ON ONE BAGHOUSE AT HARRIS WOOLF CALIFORNIA ALMONDS

September 14, 1992

Prepared for:

Harris Woolf California Almonds
Route 1, Box 470
Coalinga, California 93210

October 1992

Prepared by:

Steiner Environmental, Inc.
4930 Boylan Street
Bakersfield, California 93308

Report PS-92-2909/Project 7242-92

SECTION 1

INTRODUCTION

At the request of Harris Woolf California Almonds, Steiner Environmental, Inc. conducted a series of emission tests on the effluent of a baghouse located at their almond processing plant located near Coalinga, California. These tests were conducted on September 14, 1992. The purpose of these tests was to determine compliance with Fresno County APCD Rules and Regulations.

Almonds are hauled to the plant by trucks and are bottom dumped into a pit with a conveyor. The emissions from this almond receiving/ pre-cleaning facility (Permit to Operate No. 1140140101R) are controlled by a Saunco baghouse (Model No. RA12-252-5040) containing 252 polyester dacron bags each six inches in diameter and 144 inches long. The total surface area is 5040 ft^2 and the air-to-cloth ratio is 6.94 to 1.0 at an air flow of 35,000 acfm.

Almonds are hulled and shelled in another part of the plant and the emissions from these processes are also controlled by a baghouse (Permit to Operate No. 1140140102R). A Saunco baghouse (Model RA12-312-6240) with one compartment containing 312 polyester dacron bags each six inches in diameter and 144 inches long with a rated air flow of 77,500 acfm and an airleg recycle with a rated air flow of 23,000 acfm. The

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TABLE OF CONTENTS

Section		Page
1	INTRODUCTION	1-1
2	TEST MATRIX	2-1
3	TEST RESULTS	3-1
4	SAMPLING EQUIPMENT AND PROCEDURES	4-1
5	ANALYTICAL PROCEDURES	5-1
6	QUALITY ASSURANCE	6-1
	APPENDIX A - STEINER ENVIRONMENTAL RAW DATA	A-1
	APPENDIX B - HARRIS WOOLF OPERATING DATA	B-1

SECTION 1

INTRODUCTION

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total bag surface area is 6,240 ft^2 for an air-to-cloth ratio of 12.4 to 1.0.

Triplicate particulate tests were performed using EPA Method 5 on the outlet duct from the receiving/pre-cleaner baghouse prior to the fan. No PM_{10} tests were conducted. Fresno County has agreed that if the baghouses passed the particulate tests, then they would also pass the PM_{10} tests, since PM_{10} is a fraction of the total particulate emitted from the baghouses.

Section 2 of the report presents the test matrix for this program.

SECTION 2

TEST PROGRAM

Table 2-1 presents the test matrix for this program. The baghouse was in continuous operation during the test program.

Section 3 of the report summarizes the test results.

TABLE 2-1. RECEIVING/PRE-CLEANING BAGHOUSE TEST MATRIX

Date	Test No.	Test Parameter	Test Time
9/14/92	1	Particulates	7:47 am - 9:55 am
	2	Particulates	10:30 am - 12:37 pm
	3	Particulates	1:12 pm - 3:19 pm

SECTION 3

TEST RESULTS

Table 3-1 summarizes the test results for the receiving/pre-cleaning baghouse.

3.1 RECEIVING/PRE-CLEANING BAGHOUSE

The permit limits particulate (and PM_{10}) emissions to 0.004 gr/scf, 1.20 lb/hr or 28.8 lb/day based on a 24-hour operating day. The measured emissions were 0.0032 gr/scf, 0.87 lb/hr or 20.88 lb/day. This baghouse was in compliance with the permit limits.

TABLE 3-1. SUMMARY OF SOURCE EMISSION TEST DATA (60 dF)

Unit Tested : HARRIS WOOLF PRECLEANER BAGHOUSE Date : SEPT 14,1992

Test Number	1	2	3	Average
Test Condition				
Barometric Pressure (in. Hg)	29.46	29.52	29.48	29.49
Stack Pressure (in. Hg)	28.61	28.71	28.69	28.67
Stack Area (ft2)	10.08	10.08	10.08	10.08
Elapsed Sampling Time (min.)	120.0	120.0	120.0	120.00
Volume Gas Sampled (dscf)	105.253	94.912	102.526	100.897
F-Factor				
MMBtu/Bbl				
GAS DATA				
Average Gas Velocity (fps)	54.78	53.41	55.93	54.70
Average Gas Temperature (dF)	77.13	91.38	97.46	88.66
Gas Flowrate (dscfm)	30,439	28,961	29,964	29,788
Gas Analysis (Volume %)				
Carbon Dioxide, dry	0.00	0.00	0.00	0.00
Oxygen, dry	20.90	20.90	20.90	20.90
Water	0.78	0.98	0.99	0.92
EMISSION CONCENTRATION				
Filterable Particulate (gr/dscf)	0.0040	0.0023	0.0032	0.0032
Total Particulate (gr/dscf)	0.0042	0.0025	0.0035	0.0034
EMISSION RATE - lb/hr				
Filterable Particulate	1.05	0.58	0.83	0.82
Total Particulate	1.09	0.63	0.90	0.87
EMISSION FACTOR - lb/day				
Filterable Particulate	25.20	13.92	19.92	19.68
Total Particulate	26.16	15.12	21.60	20.88

SECTION 4

SAMPLING EQUIPMENT AND PROCEDURES

This section of the report describes the equipment and procedures used to conduct the particulate tests on this program.

4.1 PRELIMINARY MEASUREMENTS

Before conducting the stack tests a series of preliminary measurements were made to determine:

- The location of the sampling site and the number and location of the sampling points to be used (EPA Method 1)
- The velocity, temperature and pressure of the gases in the stack (EPA Method 2)
- The composition of the stack gases (EPA Method 3)
- The moisture content of the stack gases (EPA Method 4)

Using the results of these preliminary measurements and the calibration constants for the sampling train, a series of calculations were made to determine the value of K, a constant, and N_d, ideal nozzle diameter, required to run an isokinetic test according to the equation:

$$\Delta H = \left[\frac{60^2\ \pi^2\ (K_p)^2\ (C_p)^2\ (1-B_{wo})^2\ P_s\ MW_d}{576^2\ (K_o)^2\ MW_s\ P_m}\right] (N_d)^4 \left(\frac{T_m}{T_s}\right) (\Delta P)$$

where

$$K = \left[\frac{60^2 \, \pi^2 \, (K_p)^2 \, (C_p)^2 \, (1-B_{wo})^2 \, P_s \, MW_d}{576^2 \, (K_o)^2 \, MW_s \, P_m} \right]$$

An actual nozzle, whose diameter was as close as possible to the ideal nozzle diameter, was selected for the test. Isokinetic sampling rates for each sampling point in the stack were computed using the equation:

$$\Delta H = (K) \, (N_d)^4 \left(\frac{T_m}{T_s} \right) (\Delta P)$$

Since K and N_d were known, and remain constant during a test, the only variables were the meter temperatures, the stack gas temperature and the velocity pressure for each sampling point.

4.2 PREPARATION OF THE PARTICULATE SAMPLING TRAIN

All sampling train components were cleaned in the laboratory (soap and water, tap water rinse, distilled water rinse, and IPA rinse) to eliminate previous contamination. The sampling train components were sealed and transported to the sampling site in a mobile lab. The EPA Method 5 equipment used to measure particulates (filterable and total) consisted of:

- A calibrated 316 stainless steel nozzle for isokinetic sampling
- A heated Pyrex glass sampling probe (4 feet long) equipped with an S-type pitot tube and a thermocouple to measure stack velocity, pressure and temperature

- A heated Pyrex glass filter holder containing a weighed 100-mm Whatman 934 AH glass fiber filter
- A Pyrex glass impinger train in an icebath (impingers 1 and 2 contained 100-ml distilled water; bubbler 3 was dry; bubbler 4 contained a weighed amount of silica gel)
- An umbilical to connect the probe and sample box to the control module
- A control module containing a vacuum pump, a calibrated dry gas meter and a calibrated orifice meter to measure the pressure, temperature and flowrate throughout the train.

The sampling train was charged in the mobile lab using freshly prepared reagents. Each impinger and its contents was weighed to the nearest 0.1 gm on a calibrated electronic balance. Blanks of all filters and reagents were retained for subsequent analysis. The sampling point locations were marked on the probe using a high-temperature marker. The sampling train was completely assembled and lifted to the sampling site.

4.3 SAMPLING PROCEDURES FOR PARTICULATE SAMPLING TRAIN

Prior to a test, the sampling train was heated and leak-checked at 15-inches Mercury to insure leakage was less than 0.02 cfm or 4% of the average sampling rate. The S-type pitot tube was also leak-checked. The sampling train was installed on the unirail and the probe was inserted into the stack at the farthest point. An isokinetic sampling rate was calculated using an HP-41CV calculator for each sampling point on the traverse (12 points per traverse, 2 traverses at 90°). Each point was sampled for an equal period of time (5.0 minutes) and all pertinent data were recorded on the data sheet for each point. The probe and sample box

were maintained at 250°F throughout the traverse. The gases leaving the impinger train were maintained at <68°F. At the end of a traverse, the probe was withdrawn from the stack and the entire sampling train was transferred intact to the next sampling port. The other traverse of the stack was completed and the sampling train was withdrawn for the final leak-check. This leak-check was performed at 15-inches Mercury or at the highest vacuum achieved during the test. The S-type pitot tube was also checked at this time. The probe, nozzle, filter holder and impinger train were sealed with aluminum foil and lowered to the mobile lab for sample recovery.

4.4 SAMPLE RECOVERY PROCEDURES FOR PARTICULATE SAMPLING TRAIN

Sample recovery for the nozzle and probe occurred on the stack. The nozzle and probe were brushed and rinsed three times using ACS reagent grade acetone into a polyethylene sample bottle. Sample recovery for the filter holder and impinger train occurred in the mobile lab. The 100-mm filter was removed from the 4-inch filter holder and sealed in its petri dish. The front half of the 4-inch glass filter holder was brushed and rinsed with acetone. Each impinger was removed from the icebath, wiped dry and weighed to the nearest 0.1 gm. The contents of impinger 1 were transferred to a polyethylene sample bottle. The back half of the 4-inch glass filter holder, the glass connectors, impingers 1, 2 and 3 were rinsed with distilled water and the rinsings were transferred to this same bottle. All sample bottles and petri dishes were marked and labeled. A chain-of-custody log was completed and the field data sheet was also labeled with the sample ID numbers. The sampling train was then recharged in preparation for the next test.

SECTION 5

ANALYTICAL PROCEDURES

This section of the report describes the procedures used to analyze the samples collected during the test program. All analyses were performed in the Steiner Environmental, Inc. climate-controlled laboratory located in Bakersfield, California.

5.1 ANALYSIS OF PARTICULATE SAMPLES

5.1.1 Nozzle, Probe, Filter Holder Wash

The volume of the acetone washings was measured and the washings were transferred to clean, tared, aluminum weighing dishes. The dishes were placed on temperature-controlled water bath under a fume hood and gently heated to dryness (100°F). The dishes with the dry residue were desiccated and weighed repeatedly at 6-hour intervals until a constant weight was achieved (to the nearest 0.01 mg with a tolerance of <0.1 mg between weighings). The ACS reagent grade acetone blank was treated in the same manner.

5.1.2 Filter

The 100-mm filter was removed from its petri dish and transferred to an oven where it was heated for 2 hours at 105°C. The filter was then desiccated and weighed repeatedly at 6-hour intervals until a constant weight was achieved (to nearest 0.01 mg with a tolerance of <0.1 mg

between weighings). An unused, tared blank filter was treated in the same manner.

5.1.3 Condensible Particulate

The volume of sample was measured and the entire volume was transferred to a clean, tared glass evaporating dish. The dish was placed on a temperature-controlled hot plate under a fume hood and gently heated to dryness (150°F). The dish with the dry residue was desiccated and weighed repeatedly at 6-hour intervals until a constant weight was achieved (to nearest 0.01 mg with a tolerance of <0.1 mg between weighings). A blank of the distilled water was treated in the same manner.

SECTION 6

QUALITY ASSURANCE

This section of the report describes the QA/QC procedures employed on the test program.

6.1 PARTICULATE SAMPLING EQUIPMENT

A detailed record of repair and maintenance to each sampling train is kept. Preventative maintenance to each system is performed periodically to avoid complete component breakdown during a field test.

A detailed record of sampling system calibrations is also kept. Calibration data for the sampling nozzles, pitot tubes, dry gas meters and orifice meters are available for review. Results of the EPA Quality Assurance Branch bi-annual audits of the dry gas meter and orifice meter combinations are also logged and verify our in-house calibration data. The calibration data for the equipment used on this program can be found in the Appendix of this report.

6.2 LAB ANALYSIS

All field samples are assigned a label and an ID number. This ID is also affixed to a chain-of-custody log and to the field data sheet to eliminate any chance of sample mixup.

Prior to analysis, all glassware is thoroughly cleaned (soap and water, tap water rinse, distilled water rinse, IPA rinse) to eliminate

***** STEPS error listing 04/14/94 15:40:35 *****

Please report to Pacific Environmental Services, Inc.
PO Box 12077
Research Triangle Park, NC 27709

(919)941-0333 FAX (919)941-0234

Error number: 12
Error message: Variable 'NRE_EST_EM' not found.
Line number of error: 346
Program where error occurred: _QP40W1PHK

Number of FILES specified in CONFIG.SYS = 109
Remaining free space on disk drive = 13272 Kilobytes
Available conventional memory = 125760 bytes
Total memory available to FoxPro = 285920 bytes
Memory used by variables, files, etc. = 96320 bytes

***** Program trace-back information *****
C:\MODIFY\STEPS.APP
ON...
FILE_POP.FXP
ON...
FRTS.FXP
ON...
FRTS_RPT.SPX
PROCEDURE _QP40W1PHK FRTS_RPT.SPX
ON...
ERR_TRAP.FXP

***** System memory contents *****

MBELL	Pub	C	""
MSTR_KEY	Pub	C	""
MMSTR_DBF	Pub	C	""
MSG	Pub	L	.F.
MMODE	Pub	C	""
MAP_YN	Pub	C	"Y"
SUPER_OK	Pub	L	.F.
CE_EDIT_OK	Pub	L	.F.
E_EDIT_OK	Pub	L	.F.
C_EDIT_OK	Pub	L	.F.
VIEW_OK	Pub	L	.F.
MONITOR	Pub	C	"color"
VERSION	Pub	C	"Version 2.1b"
PASSINIT	Pub	C	"DWH"
UPDTINIT	Pub	C	" "
SUPEROK	Pub	L	.T.
CE_EDITOK	Pub	L	.T.
E_EDITOK	Pub	L	.T.
C_EDITOK	Pub	L	.T.
VIEWOK	Pub	L	.T.
NORMAL	Pub	C	"w+/b"

```
GET             Pub     C  "gr+/r"
SAY             Pub     C  "n/gr"
HIGH            Pub     C  "g/b"
ERROR           Pub     C  "w+*/b"
HNORMAL         Pub     C  "n/gr"
HHIGH           Pub     C  "w+/b"
HBDR            Pub     C  "gr+/gr"
WNORMAL         Pub     C  "w/gr"
WHIGH           Pub     C  "w/gr"
F1              Pub     C  "w/gr"
F2              Pub     C  "w/gr"
F3              Pub     C  "gr+/gr"
F4              Pub     C  "b/w"
F5              Pub     C  "r/gr"
COLOR           Pub     L  .F.
PASSWORD        Pub     C  "SECRET"
MSCRN           Pub     L  .F.
MMENU           Pub     L  .F.
IDX_LEN         Pub     N           0  (          0.00000000)
MMSTR_KEY       Pub     C  ""
MICONPG         Pub     L  .F.
OLDICON         Pub     C  ""
SATELLITE       Priv    L  .F.                                  STEPS
HQ_SAT          Priv    L  .F.                                  STEPS
PROJ_VER        Priv    C  "DE"                                 STEPS
DATFILE         Priv    C  "datapath.dat"                       STEPS
DAT_HANDLE      Priv    N           7  (          7.00000000)  STEPS
DATAPATH        Priv    C  "c:\modify\satdata"                  STEPS
OLD_RSRC        Priv    C  "FOXUSER"                            STEPS
BATCH_EDIT      Priv    L  .F.                                  STEPS
STARTIME        Priv    C  "15:37:46"                           STEPS
STARTDATE       Priv    D  04/14/94                             STEPS
ICONDIS         Priv    L  .F.                                  STEPS
MENU_LP         Priv    L  .T.                                  STEPS
TALKSTAT        Priv    C  "OFF"                                FRTS_RPT
COMPSTAT        Priv    C  "OFF"                                FRTS_RPT
RPTTORUN        Priv    C  "voc_rpt"                            FRTS_RPT
DEVICE          Priv    C  "Screen"                             FRTS_RPT
RPT_SEL         Priv    N           3  (          3.00000000)  FRTS_RPT
OUT_SEL         Priv    N           1  (          1.00000000)  FRTS_RPT
OK_SEL          Priv    N           1  (          1.00000000)  FRTS_RPT
TMP_QUERY1      Priv    C  "65747141.DBF"                       _QP40W1PHK
TEMPFILE        Priv    C  "65752414.txt"                       _QP40W1PHK
ERR_NUM         Priv    N          12  (         12.00000000)  ERR_TRAP
ERR_MESS        Priv    C  "Variable 'NRE_EST_EM' not found."   ERR_TRAP
ERR_MESS1       Priv    C  "Variable 'NRE_EST_EM' not found."   ERR_TRAP
ERR_LINENU      Priv    N         346  (        346.00000000)  ERR_TRAP
ERR_PROGNA      Priv    C  "_QP40W1PHK"                         ERR_TRAP
I               Priv    N          11  (         11.00000000)  ERR_TRAP
   70 variables defined,    545 bytes used
  186 variables available

Print System Memory Variables

_ALIGNMENT      Pub     C  "LEFT"
_BOX            Pub     L  .T.
_CALCMEM        Pub     N        0.00  (          0.00000000)
_CALCVALUE      Pub     N        0.00  (          0.00000000)
_CUROBJ         Pub     N          -1  (         -1.00000000)
_DBLCLICK       Pub     N        0.49  (          0.49432944)
```

```
_DIARYDATE   Pub    D  04/14/94
_FOXDOC      Pub    C  ""
_FOXGRAPH    Pub    C  ""
_GENGRAPH    Pub    C  ""
_GENMENU     Pub    C  ""
_GENPD       Pub    C  "stepspd.app"
_GENSCRN     Pub    C  ""
_GENXTAB     Pub    C  ""
_INDENT      Pub    N           0  (          0.00000000)
_LMARGIN     Pub    N           0  (          0.00000000)
_MLINE       Pub    N           0  (          0.00000000)
_PADVANCE    Pub    C  "FORMFEED"
_PAGENO      Pub    N           3  (          3.00000000)
_PBPAGE      Pub    N           1  (          1.00000000)
_PCOLNO      Pub    N          55  (         55.00000000)
_PCOPIES     Pub    N           1  (          1.00000000)
_PDRIVER     Pub    C  ""
_PDSETUP     Pub    C  ""
_PECODE      Pub    C  ""
_PEJECT      Pub    C  "BEFORE"
_PEPAGE      Pub    N       32767  (      32767.00000000)
_PLENGTH     Pub    N          66  (         66.00000000)
_PLINENO     Pub    N          31  (         31.00000000)
_PLOFFSET    Pub    N           0  (          0.00000000)
_PPITCH      Pub    C  "DEFAULT"
_PQUALITY    Pub    L  .F.
_PRETEXT     Pub    C  ""
_PSCODE      Pub    C  ""
_PSPACING    Pub    N           1  (          1.00000000)
_PWAIT       Pub    L  .F.
_RMARGIN     Pub    N          80  (         80.00000000)
_STARTUP     Pub    C  ""
_TABS        Pub    C  ""
_TALLY       Pub    N         249  (        249.00000000)
_TEXT        Pub    N          -1  (         -1.00000000)
_THROTTLE    Pub    N        0.00  (          0.00000000)
_WRAP        Pub    L  .F.

   45 System Variables Defined

Menu and Pad Definitions

Menu name
STEPS          227 bytes
      Pad name
      MAP              60 bytes
      REPT             60 bytes
      FILE             60 bytes
      UTIL             60 bytes
      QUIT             60 bytes
      FILL             60 bytes

    1 Menu Defined

Popup Definitions

FRTS_POP       527 bytes
UTIL_POP       1067 bytes
LKUP_POP       287 bytes
FILE_POP       767 bytes
```

```
REPORT_POP    527 bytes
MAP_AIR       407 bytes
MAP_1         467 bytes

    7 Popups Defined

Window Definitions

Name          From      To        Size
HELP          1,46      10,76     468 bytes
CALC          1,44      21,76     1188 bytes
CALCHELP      1,44      21,76     1188 bytes
ICON_WIN      0,0       50,79     8164 bytes
_QP40W10P4    3,9       20,69     1892 bytes
ERROR         8,10      16,69     820 bytes
ERR_WIND      0,0       24,79     3588 bytes   ACTIVE

    7 Windows Defined



***** System status *****

Processor is INTEL 80486
Select area:  1, Database in Use: C:\MODIFY\SATDATA\SYS.DBF    Alias: SYS
      Lock(s): Exclusive USE

Select area:  2, Database in Use: C:\MODIFY\SATDATA\PLANT.DBF    Alias: PLANT
 Structural CDX file:   C:\MODIFY\SATDATA\PLANT.CDX
          Index tag:   PLANT_NAME   Key: NAME
          Index tag:   PLANT_ID   Key: STATE_CODE+CNTY_CODE+PLANT_ID
          Index tag:   CITY_NAME   Key: STATE_CODE+CITY_NAME
          Memo file:   C:\MODIFY\SATDATA\PLANT.FPT
      Lock(s): Exclusive USE

Select area:  3, Database in Use: C:\MODIFY\GEO.DBF    Alias: GEO
 Structural CDX file:   C:\MODIFY\GEO.CDX
          Index tag:   FIPSTATE   Key: FIPS_STATE
          Index tag:   FIPSCNTY   Key: FIPS_STATE+FIPS_CNTY
          Index tag:   COUNTY   Key: STATE+COUNTY
          Index tag:   STATE   Key: STATE Unique
          Index tag:   NCCNTY   Key: FIPS_STATE+FIPS_CNTY   For: FIPS_STATE="37
          Index tag:   ABBREV2   Key: ABBREV2+STATE Unique
      Lock(s): Exclusive USE

Select area:  4, Database in Use: C:\MODIFY\SATDATA\PLNTPOLL.DBF    Alias: PLNTP
 Structural CDX file:   C:\MODIFY\SATDATA\PLNTPOLL.CDX
          Index tag:   POLLUTANT   Key: STATE_CODE+CNTY_CODE+PLANT_ID+POLLUTANT
          Index tag:   PLANT   Key: STATE_CODE+CNTY_CODE+PLANT_ID Unique   For:
          Memo file:   C:\MODIFY\SATDATA\PLNTPOLL.FPT
      Lock(s): Exclusive USE

Currently Selected Database:
Select area:  5, Database in Use: C:\MODIFY\65747141.DBF    Alias: TMP_QUERY1
      Lock(s): Exclusive USE

File search path: C:\MODIFY\SATDATA
Default disk drive: C:
Print file/device:  PRN:
Work area =   5
```

```
Margin     =   0
Decimals   =   2
Memowidth  =  50
Typeahead  =  20
Blocksize  =  64
Reprocess  = Automatic
Refresh    =   0 SECONDS
No EMS

Date format: American
Macro Hot Key = SHIFT+F10
UDF parameters are passed by: VALUE

ON KEY LABEL hot keys:
F1              null = .t.
F2              null = .t.
F3              null = .t.
F4              null = .t.
F5              null = .t.
F6              null = .t.
F7              null = .t.
F8              null = .t.
F9              null = .t.
F10             null = .t.
F11             null = .t.
F12             null = .t.
CTRL+N          null = .t.
CTRL+P          null = .t.
CTRL+B          null = .t.
CTRL+T          null = .t.
CTRL+END        null = .t.
Textmerge Options
          Delimiters:  Left = <<  Right = >>
          Show

Alternate  - off   Console    - off   Fixed      - off   Safety     - off
ANSI       - off   Cursor     - on    Heading    - off   Space      - on
Bell       - off   Debug      - on    Help       - on    Status     - off
Blink      - on    Deleted    - on    Intensity  - on    Sticky     - on
Brstatus   - off   Device     - scrn  Lock       - off   Sysmenus   - on
Carry      - off   Echo       - off   Logerrors  - on    Talk       - off
Century    - off   EMS        - on    Mouse      - on    Textmerge  - off
Clear      - on    Escape     - off   Multilocks - off   Title      - off
Color      - on    Exact      - off   Near       - off   Unique     - off
Compatible - off   Exclusive  - off   Optimize   - on
Confirm    - on    Fields     - off   Print      - on


Modules loaded:  CURSON  CURSOFF



***** End of error listing *****
```

any contamination. The evaporating dishes used to evaporate the washings are treated the same as a sample (dried in an oven, desiccated and weighed repeatedly at 6-hour intervals until a constant weight is achieved). The glassware used to measure volumes and make transfers and dilutions are all NBS Class A to insure accurate measurements. All weighings are carried out on a Sartorius Research Model R160P electronic semi-micro balance supported by a marble table in a separate room from the main analytical laboratory. The balance is calibrated regularly against an NBS Class S-1 weight.

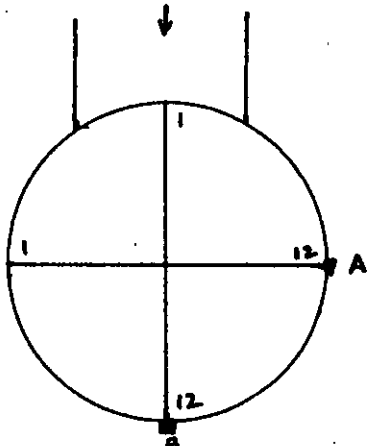
All reagents used in the field and in the laboratory are ACS reagent grade and blanks of these reagents are evaluated for every set of tests. Blanks are taken in the field from the squeeze bottles and not the original container. Records are kept on these blanks to insure consistent quality of the reagents.

APPENDIX A

STEINER ENVIRONMENTAL RAW DATA

Steiner Environmental, Inc.

SAMPLING POINT LOCATION DATA SHEET



Plant Harris Woolf

Date 9/14/92

Test Location Precleaning Baghouse

Upstream Dist./Dia. 41" / 1.0 ϕ

Downstream Dist./Dia. 328" / 7.6 ϕ

No. of Sampling Points 24

Stack Dimension 43

Coupling Length 3.75

2, 3 -inch MPT/FPT/Flange has hooks

plant supplies ladder

50' power

no rope

flow goes down

high -ve pressure; go in but running

bring slack tube mano

XEQ PNT earplugs

Sample Point	Dist	Sample Point	Dist	Sample Point	Dist	Sample Point	Dist
1	4.7						
2	6.6						
3	8.8						
4	11.4						
5	14.5						
6	19.0						
7	31.5						
8	36.0						
9	39.1						
10	41.7						
11	43.9						
12	45.8						

SAMPLING POINT RELOCATION: #1 → 4.75 #2 → 45.75

Steiner Environmental, Inc.

PLANT Harris Wolf TEST TYPE M5 FIELD TEST DATA SHEET (Page 1 of 2)

Date 9/14/92 Barometric Pressure 29.46
Test Location Pre-Cleaner Static in.wg. -11.6
Run Number 1 Probe Type/Length 6/4'
Stack Diameter 43 Pitot Coefficient 0.84
Operator JS Meter Box No./Y 21313/1.0098
Filter No. 981 Nozzle No./Size 1458/.2343

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
DI	502.3	529.0	-26.7
DI	558.8	547.1	11.7
dry	449.2	443.5	5.7
S.G.	707.4	680.2	27.2
		TOTAL	17.9

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate			"Hg
Initial	0.018		15
Final	0.009		8

[TEMPERATURE °F]

Sample Point	7:47 Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	$\sqrt{\Delta P}$	Comments
A 1	0	0.94	2.59	81.855	66	244	247	63	61	58	7.0	0.970	pitot ok
2		0.96	2.64	86.434	67	241	260	63	61	58	7.0	0.980	
3	10	0.98	2.70	91.019	68	248	252	63	63	58	7.0	0.990	
4		0.96	2.64	95.642	69	248	241	63	65	57	7.0	0.980	visible particles on filter & light brown grey coating
5	20	0.96	2.64	100.250	70	249	250	65	66	58	7.0	0.980	
6		0.93	2.56	104.865	71	251	258	63	68	60	7.0	0.964	
7	30	0.88	2.43	109.400	72	248	252	63	69	62	6.5	0.938	
8		0.87	2.40	113.868	73	251	246	63	71	63	6.5	0.933	31954 Final
9	40	0.84	2.32	118.294	74	250	251	64	72	64	6.5	0.917	
10		0.64	1.77	122.645	75	250	256	64	73	66	5.0	0.800	31955 Init
11	50	1.10	3.04	126.525	76	252	256	64	75	67	7.5	1.049	
12		1.13	3.14	131.262	74	254	255	63	76	68	8.0	1.063	31956 Final
	60			136.246									

A-3

Stein Environmental, Inc.

PLANT Harris Woolf TEST TYPE M5 FIELD TEST DATA SHEET (Page 2 of 2)

Run No. 1 Date: 9/14/92 [TEMPERATURE °F]

Sample Point	8:55 Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft³	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	√ΔP	Comments
B 1	0	0.81	2.24	136.246	79	246	239	71	77	72	6.0	0.900	
2		0.85	2.35	140.575	80	244	244	66	77	71	6.0	0.922	
3	10	0.87	2.40	144.945	81	240	262	66	78	71	6.0	0.933	
4		0.91	2.52	149.395	81	263	245	68	79	72	6.5	0.954	
5	20	0.91	2.51	153.942	83	251	223	67	80	72	6.5	0.954	
6		0.91	2.52	158.520	83	250	257	68	82	74	6.5	0.954	
7	30	0.89	2.46	163.115	84	246	237	68	83	75	6.5	0.943	
8		0.90	2.49	167.642	85	250	247	68	84	75	6.5	0.949	
9	40	0.89	2.47	172.185	85	248	241	68	86	77	6.5	0.943	
10		0.90	2.50	176.820	85	250	228	68	86	77	6.5	0.949	
11	50	0.69	1.83	181.298	86	252	229	68	87	78	5.0	0.831	
12		0.74	2.07	185.335	84	249	229	68	88	80	5.5	0.860	
	60			189.469									pitot ok
	120		2.47	107.614	77.13				71.	88		0.943	

A-4

Steiner Environmental, Inc.

PLANT Harris Woolf TEST TYPE M5 FIELD TEST DATA SHEET (Page 1 of 2)

Date 9/14/92 Barometric Pressure 29.52
Test Location Pre Cleaner Static in.wg. -11.0
Run Number 2 Probe Type/Length 6/4'
Stack Diameter 48 Pitot Coefficient 0.84
Operator JS Meter Box No./γ 21313/1.0098
Filter No. 982 Nozzle No./Size 1450 / .2343

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
DI	520.2	531.6	-11.4
DI	561.5	555.5	6.0
dry	432.7	430.0	2.7
S.G.	744.9	722.0	22.9
		TOTAL	20.2

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate			"Hg
Initial	0.017		15
Final	0.007		6.5

[TEMPERATURE °F]

Sample Point	10:30 Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	√ΔP	Comments
A 1	0	0.88	2.47	190.014	89	240	250	63	92	90	6.0	0.938	pitot ok
2		0.92	2.58	194.476	90	240	255	64	96	91	6.5	0.959	
3	10	0.92	2.60	199.107	88	241	254	64	97	93	6.5	0.959	visible particles
4		0.92	2.62	203.774	88	243	253	65	101	95	6.5	0.959	& very light gray
5	20	0.88	2.51	208.498	88	246	265	67	103	98	6.5	0.938	coating
6		0.88	2.53	213.139	88	246	269	65	105	101	6.5	0.938	
7	30	0.82	2.35	217.787	89	252	257	65	106	103	6.0	0.906	31957 FRW
8		0.80	2.31	222.349	89	249	253	66	108	105	6.0	0.894	
9	40	0.66	1.91	226.857	89	250	255	66	110	107	5.0	0.812	31958 MF
10		0.74	2.14	231.030	89	248	263	66	111	108	5.5	0.860	
11	50	0.62	1.80	235.251	89	249	256	66	112	109	5.0	0.787	31959 BMW
12		0.64	1.86	239.280	89	248	264	66	114	111	5.0	0.800	
	60			243.335									

A-5

Stein Environmental, Inc.

PLANT Harris Woolf TEST TYPE M5 FIELD TEST DATA SHEET (Page 2 of 2)

Run No. 2 Date: 9/14/92 [TEMPERATURE °F]

Sample Point	11:37 Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft³	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	√ΔP	Comments
B 1	0	0.78	2.27	243.335	91	243	244	74	116	114	4.5	0.883	
2		0.83	2.41	247.275	92	242	229	67	116	114	5.0	0.911	
3	10	0.86	2.50	251.357	93	244	257	67	116	114	5.0	0.927	
4		0.90	2.62	255.522	93	244	246	67	117	114	5.5	0.949	
5	20	0.91	2.65	259.815	93	245	251	67	118	115	5.5	0.954	
6		0.91	2.64	264.180	94	246	240	68	118	115	5.5	0.954	
7	30	0.83	2.41	268.558	95	247	247	68	119	116	5.0	0.911	
8		0.85	2.47	272.725	95	247	255	68	120	117	5.0	0.922	
9	40	0.90	2.62	276.917	95	246	249	68	120	117	5.5	0.949	
10		0.84	2.59	281.239	96	248	257	69	120	118	5.5	0.943	
11	50	0.80	2.32	285.659	96	249	250	69	120	117	5.0	0.894	
12		0.78	2.27	289.655	95	244	250	69	121	118	5.0	0.883	pitot ok
	60			293.802									
	120		2.39	103.788	91.38				109	90		0.9097	

A-6

Steiner Environmental, Inc.

PLANT Harris Wolf TEST TYPE M6 FIELD TEST DATA SHEET (Page 1 of 2)

Date 9/14/92 Barometric Pressure 29.48
Test Location PreCleaner Static in.wg. -10.8
Run Number 3 Probe Type/Length G/4'
Stack Diameter 48 Pitot Coefficient 0.84
Operator JS Meter Box No./γ 21313/1.0090
Filter No. 983 Nozzle No./Size M5B/.2343

[IMPINGER VOLUMES/WEIGHTS]

Contents	Final	Initial	Net
DI	521.6	533.0	-11.4
DI	550.9	543.8	7.1
dry	441.5	437.3	4.2
s.G.	732.7	710.5	22.2
		TOTAL	22.1

[GAS COMPOSITION]

Time	CO_2	O_2	CO
Leakrate			"Hg
Initial	0.010		15
Final	0.009		5

[TEMPERATURE °F]

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft^3	Stack	Probe	Oven	Imp.	Gas Meter IN	Gas Meter OUT	Pump Vacuum in.Hg	√ΔP	Comments
A 1	0	0.93	2.73	294.290	96	244	254	90	124	124	3.0	0.964	pitot ok
2		0.95	2.77	299.170	96	239	249	75	120	122	3.0	0.975	
3	10	0.95	2.76	304.060	96	244	257	75	118	119	3.0	0.975	Visible particles
4		0.95	2.75	308.950	96	245	262	70	117	117	3.0	0.975	& very light grey
5	20	0.93	2.69	313.992	96	247	256	65	116	116	3.0	0.964	coating
6		0.91	2.63	318.842	96	251	260	65	115	114	3.0	0.954	
7	30	0.83	2.39	323.555	96	254	259	65	114	113	3.0	0.911	31960
8		0.83	2.39	328.151	96	254	259	65	114	112	3.0	0.911	CNW
9	40	0.88	2.53	332.694	96	255	257	65	113	111	3.0	0.938	31961
10		0.86	2.46	337.391	97	253	261	66	112	110	3.0	0.927	NE
11	50	0.86	2.46	342.100	97	255	254	66	112	110	3.0	0.927	31962
12		0.86	2.46	346.545	96	248	243	66	111	110	3.0	0.927	ONW
	60			351.081									

A-7

Steiner Environmental, Inc.

PLANT Harris Woolf TEST TYPE M5 FIELD TEST DATA SHEET (Page 2 of 2)
DATE 9/14/92 RUN NO. 3
TEST LOCATION Precleaner OPERATOR JS

Sample Point	Time	ΔP in wg	ΔH in wg	Gas Meter Volume Ft³	TEMPERATURE °F						Pump Vacuum in.Hg	√ΔP	Comments
					Stack	Probe	Oven	Imp.	Gas Meter In	Gas Meter Out			
	2:19												
B 1	0	0.82	2.33	351.081	100	243	263	90	111	109	3.0	0.906	
2		0.92	2.61	355.525	99	249	254	75	109	107	3.0	0.959	
3	10	0.92	2.61	360.174	98	255	255	70	108	107	3.0	0.959	
4		0.94	2.67	364.940	98	252	260	66	108	105	3.0	0.970	
5	20	0.94	2.67	369.600	98	252	249	66	108	105	3.0	0.970	
6		0.92	2.61	374.383	98	256	253	66	108	105	3.0	0.959	
7	30	0.91	2.57	379.110	99	255	256	67	107	104	3.0	0.954	
8		0.91	2.57	383.774	99	251	257	67	108	104	3.0	0.954	
9	40	0.92	2.60	388.530	99	255	254	67	108	104	3.0	0.959	
10		0.89	2.51	393.137	99	250	251	67	108	103	3.0	0.943	
11	50	0.87	2.46	397.715	99	255	244	67	107	103	3.0	0.933	
12		0.83	2.34	402.265	99	253	252	68	107	103	3.0	0.911	pitot ok
	60			406.689									
													31963
													31964
													31965
	120		2.57	412.399	97.46				MD.83			0.9469	

A-8

Forms 1B: Fielddat.frm 1/91

Steiner Environmental, Inc.

Date: 9/15/92

Test Location: Precleaner Baghouse

SAMPLE HANDLING/LOG-IN

NO	SAMPLE TYPE	VOLUME	COMMENTS
1	31954 5 Meth FHW Sample 1 Test		
2	31955 5 Meth MF Sample 1 Test		
3	31956 5 Meth BHW Sample 1 Test		
4	31957 5 Meth FHW Sample 2 Test		
5	31958 5 Meth MF Sample 2 Test		
6	31959 5 Meth BHW Sample 2 Test		
7	31960 5 Meth FHW Sample 3 Test		
8	31961 5 Meth MF Sample 3 Test		
9	31962 5 Meth BHW Sample 3 Test		
10	31963 5 Meth FHW Sample BL Test		
11	31964 5 Meth MF Sample BL Test		
12	31965 5 Meth BHW Sample BL Test		

CHAIN-OF-CUSTODY

Signature	Date/Time	Signature	Date/Time
Jim Steiner	9/15/92 8:30am	Wayne Dobson	9/15/92 0930

A N A L Y T I C A L R E P O R T

SAMPLE TYPE	:	FHW ANALYSIS (g)	TEST DATE	:09/14/92
SAMPLING METHOD	:	M5	ANALYSIS DATE	:09/17/92
SAMPLE COMPONENT	:	ACETONE	ANALYST :	MC, WB
REQUESTED BY	:	HARRIS WOOLF		
ANALYTICAL METHOD	:	GRAVIMETRIC		

Sample ID #	Test No.	Sample Volume (ml)	Analytical Result (total sample) Uncorrected	Blank Corr. (g)
31954	1	170	0.02621	0.02592
31957	2	150	0.01125	0.01099
31960	3	180	0.02051	0.02020
31963	Bk	100	0.00017	

A N A L Y T I C A L R E P O R T

SAMPLE TYPE	:	FILTERABLE PARTICULATE	TEST DATE	:09/14/92
SAMPLING METHOD	:	M5	ANALYSIS DATE	:09/17/92
SAMPLE COMPONENT	:	100 mm FILTER	ANALYST	:MC, WB
REQUESTED BY	:	HARRIS WOOLF		
ANALYTICAL METHOD	:	GRAVIMETRIC		

Sample ID #	Test No.	Filter No.	Analytical Result (total sample) Uncorrected (g)	Blank Corr. (g)
31955	1	982	0.00165	0.00164
31958	2	981	0.00344	0.00343
31961	3	983	0.00135	0.00134
31964	Bk	984	0.00001	

A N A L Y T I C A L R E P O R T

SAMPLE TYPE	: CONDENSIBLE PARTICULATE	TEST DATE	:09/14/92
SAMPLING METHOD	: M5	ANALYSIS DATE	:09/17/92
SAMPLE COMPONENT	: DiH2O	ANALYST	:MC, WB
REQUESTED BY	: HARRIS WOOLF		
ANALYTICAL METHOD	: GRAVIMETRIC		

Sample ID #	Test No.	Sample Volume	Analytical Result (total sample) grams	
			Uncorrected	Blank Corrected
31956	1	390	0.00183	0.00089
31959	2	370	0.00205	0.00116
31962	3	370	0.00275	0.00186
31965	Bk	100	0.00024	

SOURCE TEST CALCULATIONS

PLANT : HARRIS WOOLF
PRECLEANER BAGHOUSE

RUN NO.: 1
DATE : SEPT 14,1992

STANDARD TEMP.: 60 DEG. F

METER TEMP.	= 71.88	DEG. F	STATIC PRESS.	= -11.60	in. H2O
STACK TEMP.	= 77.13	DEG. F	Cp	= 0.840	
SQ.RT. dP	= 0.9439	in. H2O	STACK I.D.	= 43.00	inch
METER ORIFICE	= 2.47	in. H2O	DUCT LENGTH	=	inch
METER VOLUME	= 107.614	Cu.Ft.	DUCT WIDTH	=	inch
METER Y	= 1.0098		STACK AREA	= 10.085	Sq.Ft.
BAR. PRESSURE	= 29.46	in.Hg	TEST TIME	= 120.00	min.
COND.(Vlc)	= 17.9	ml	NOZZLE DIA.	= 0.2343	inch

GAS ANALYSIS = 20.90 % O2 0.00 % CO
0.00 % CO2 79.10 % N2

****

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 105.253 dscf

Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic = 0.830 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.008 | Lower Bws

Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.) ..... = 0.033 | value used.

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = **********

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 28.84

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.75

P(stack) = Pbar + [Pstatic / 13.6] ..... = 28.61 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)] ..... = 54.78 ft/sec

Qs = vs x As x 60 ..... = 33,144 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92) ..... = 30,439 dscf/min

I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60) = 97.05 %

SOURCE TEST CALCULATIONS

PLANT : HARRIS WOOLF
PRECLEANER BAGHOUSE

RUN NO.: 2
DATE : SEPT 14,1992

STANDARD TEMP.: 60 DEG. F

METER TEMP.	= 109.9	DEG. F	STATIC PRESS.	= -11.00	in. H2O
STACK TEMP.	= 91.38	DEG. F	Cp	= 0.840	
SQ.RT. dP	= 0.9097	in. H2O	STACK I.D.	= 43.00	inch
METER ORIFICE	= 2.39	in. H2O	DUCT LENGTH	=	inch
METER VOLUME	= 103.788	Cu.Ft.	DUCT WIDTH	=	inch
METER Y	= 1.0098		STACK AREA	= 10.085	Sq.Ft.
BAR. PRESSURE	= 29.52	in.Hg	TEST TIME	= 120.00	min.
COND.(Vlc)	= 20.2	ml	NOZZLE DIA.	= 0.2343	inch

GAS ANALYSIS : 20.90 % O2 0.00 % CO
0.00 % CO2 79.10 % N2

****

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 94.912 dscf

Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic = 0.936 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.010 | Lower Bws value used.

Bws @ Saturated Conditions = Vapor Press. of H2O @ Dew Point Temp. / (Ps, in.Hg.) ..... = 0.051

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = **********

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 28.84

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.73

P(stack) = Pbar + [Pstatic / 13.6] ..... = 28.71 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)] ..... = 53.41 ft/sec

Qs = vs x As x 60 ..... = 32,318 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92) ..... = 28,961 dscf/min

I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60) = 91.98 %

SOURCE TEST CALCULATIONS

PLANT : HARRIS WOOLF
PRECLEANER BAGHOUSE

RUN NO.: 3
DATE : SEPT. 14,1992

STANDARD TEMP.: 60 DEG. F

METER TEMP.	= 110.83 DEG. F		STATIC PRESS.	= -10.80	in. H2O
STACK TEMP.	= 97.46 DEG. F		Cp	= 0.840	
SQ.RT. dP	= 0.9469 in. H2O		STACK I.D.	= 43.00	inch
METER ORIFICE	= 2.57 in. H2O		DUCT LENGTH	=	inch
METER VOLUME	= 112.399 Cu.Ft.		DUCT WIDTH	=	inch
METER Y	= 1.0098		STACK AREA	= 10.085	Sq.Ft.
BAR. PRESSURE	= 29.48 in.Hg		TEST TIME	= 120.00	min.
COND.(Vlc)	= 22.1 ml		NOZZLE DIA.	= 0.2343	inch

GAS ANALYSIS : 20.90 % O2 0.00 % CO
0.00 % CO2 79.10 % N2

****

Vm(std) = [T(std) + 460 / 29.92] x Vm x Y x (Pb + (dH / 13.6)) / (Tm + 460)..... = 102.526 dscf

Vw(std) =(8.9148 x 10e-5) x (Tstd + 460) x Vic = 1.024 scf

Bws = Vw(std) / (Vm(std) + Vw(std))..... = 0.010 | Lower Bws value used.

Bws ● Saturated Conditions = Vapor Press. of H2O
● Dew Point Temp. / (Ps, in.Hg.) ..... = 0.062

%EA =(%O2 - 0.5%CO)/(0.264%N2 - (%O2-0.5%CO)) x 100 = **********

Md =(.44 x %CO2)+(.32 x %O2)+[.28 x (%N2 + %CO)] = 28.84

Ms = (Md x (1-Bws)) + (18.0 x Bws)..... = 28.73

P(stack) = Pbar + [Pstatic / 13.6] ..... = 28.69 in. Hg

vs = 85.49 x CP x (Sq.Rt.dP) x [Sq.Rt.(Ts + 460) / (Ms x Ps)] ..... = 55.93 ft/sec

Qs = vs x As x 60 ..... = 33,840 acf/min

Qs(std) = Qs x (1-Bws)x((Tstd + 460)/(Ts + 460)) x (Ps/29.92) ..... = 29,964 dscf/min

I = (Ts+460) x [(0.002669 x Vlc) + (Vm(std)/(Tstd + 460)/ 29.92] x 100 / (Time x Ps x An x vs x 60) = 96.04 %

EMISSION RATE CALCULATIONS

PLANT :HARRIS WOOLF
PRECLEANER BAGHOUSE

RUN NO.: 1
DATE : SEPT 14,1992
O2 CORR.: 3.0 %

STANDARD TEMP. : 60 DEG. F

Front Half Wash (FHW)	0.02592	grams	Vm(std)	105.253	ft3
Mass Filter (MF)	0.00164	grams	Vw(std)	0.830	ft3
Back Half Wash (BHW)	0.00089	grams	Qs(std)	30,439	dscfm
Front Half Sulfate (FHS)		mg H2SO4	Bws	0.008	
Back Half Sulfate (BHS)		mg H2SO4	CO2	0.00	%
H2O2 Catch (SO2)		mg H2SO4	O2	20.90	%

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0040	gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0040	gr/dscf
gr/dscf x (12 / %CO2)		@ 12% CO2
0.00857 x Qs(std) x gr/dscf	1.05	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..		lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0041	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0042	gr/dscf
gr/dscf x (12 / %CO2)		@ 12% CO2
0.00857 x Qs(std) x gr/dscf	1.09	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..		lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	gr/scf
0.015432 x (FHS + BHS) / Vm(std)	gr/dscf
gr/dscf x (12 / %CO2)	@ 12% CO2
0.00857 x Qs(std) x gr/dscf	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	@ O2 corr.
ppm x (1 - Bws)	ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	lb/MMBtu
lb/hr / (dscfm x 60 min/hr)	lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	lb/MMBtu
Total Sulfur	lb/MMBtu

EMISSION RATE CALCULATIONS

PLANT :HARRIS WOOLF
PRECLEANER BAGHOUSE

RUN NO.: 2
DATE : SEPT 14,1992
O2 CORR.: 3.0 %

STANDARD TEMP. : 60 DEG. F

Front Half Wash (FHW)	0.01099	grams	Vm(std)	94.912	ft3
Mass Filter (MF)	0.00343	grams	Vw(std)	0.936	ft3
Back Half Wash (BHW)	0.00116	grams	Qs(std)	28,961	dscfm
Front Half Sulfate (FHS)		mg H2SO4	Bws	0.010	
Back Half Sulfate (BHS)		mg H2SO4	CO2	0.00	%
H2O2 Catch (SO2)		mg H2SO4	O2	20.90	%

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0023	gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0023	gr/dscf
gr/dscf x (12 / %CO2)		● 12% CO2
0.00857 x Qs(std) x gr/dscf	0.58	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..		lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0025	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0025	gr/dscf
gr/dscf x (12 / %CO2)		● 12% CO2
0.00857 x Qs(std) x gr/dscf	0.63	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..		lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	gr/scf
0.015432 x (FHS + BHS) / Vm(std)	gr/dscf
gr/dscf x (12 / %CO2)	● 12% CO2
0.00857 x Qs(std) x gr/dscf	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	● O2 corr.
ppm x (1 - Bws)	ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	lb/MMBtu
lb/hr / (dscfm x 60 min/hr)	lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	lb/MMBtu
Total Sulfur	lb/MMBtu

EMISSION RATE CALCULATIONS

PLANT :HARRIS WOOLF
PRECLEANER BAGHOUSE

RUN NO.: 3
DATE : SEPT 14,1992
O2 CORR.: 3.0 %

STANDARD TEMP. : 60 DEG. F

Front Half Wash (FHW)	0.02020	grams	Vm(std)	102.526	ft3
Mass Filter (MF)	0.00134	grams	Vw(std)	1.024	ft3
Back Half Wash (BHW)	0.00186	grams	Qs(std)	29,964	dscfm
Front Half Sulfate (FHS)		mg H2SO4	Bws	0.010	
Back Half Sulfate (BHS)		mg H2SO4	CO2	0.00	%
H2O2 Catch (SO2)		mg H2SO4	O2	20.90	%

F-FACTOR

10E6 x [3.64(%H) + 1.53(%C) + 0.57(%S) + 0.14(%N) - 0.46(%O2)] / (Btu/lb) x [(Tstd + 460)/528] ..... dscf/MMBtu

FILTERABLE PARTICULATE

15.432 x (FHW + MF) / [Vm(std) + Vw(std)]	0.0032	gr/scf
15.432 x (FHW + MF) / Vm(std)	0.0032	gr/dscf
gr/dscf x (12 / %CO2)		@ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.83	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..		lb/MMBtu

TOTAL PARTICULATE

15.432 x (FHW + MF + BHW) / [(Vm(std) + Vw(std)] ...	0.0035	gr/scf
15.432 x (FHW + MF + BHW) / (Vm(std)	0.0035	gr/dscf
gr/dscf x (12 / %CO2)		@ 12% CO2
0.00857 x Qs(std) x gr/dscf	0.90	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..		lb/MMBtu

TOTAL SULFATE

0.015432 x (FHS + BHS) / [Vm(std) + Vw(std)]	gr/scf
0.015432 x (FHS + BHS) / Vm(std)	gr/dscf
gr/dscf x (12 / %CO2)	@ 12% CO2
0.00857 x Qs(std) x gr/dscf	lb/hr
F-Fac x 1.4286E-4 x [20.9 / (20.9-%O2)] x gr/dscf ..	lb/MMBtu

SULFUR DIOXIDE (SO2)

1.60982 x [T(std) + 460] x (mg H2SO4) / [98.076 x Vm(std)]	ppm
ppm x [(20.9 - Oxygen Corr.) / (20.9 - %O2)]	@ O2 corr.
ppm x (1 - Bws)	ppm (wet)
8.223E-5 x Qs(std) x 64.062 x ppm / [T(std) + 460]..	lb/hr
F-Factor x 64.062 x [1.3711E-6 / [T(std)+ 460]] x [20.9 / (20.9 - %O2)] x ppm	lb/MMBtu
lb/hr / (dscfm x 60 min/hr)	lb/dscf

SULFUR (S)

(lb/MMBtu SO2) / 2	lb/MMBtu
(lb/MMBtu Total Sulfate) x (32 / 98.076)	lb/MMBtu
Total Sulfur	lb/MMBtu

DRY GAS METER / ORIFICE METER CALIBRATION DATA

Date .....JULY 20 1992 — Dry Gas Meter No. ... 103707
Bar. Press, in.Hg 29.88 — Standard Test Meter # 69279
Meter Box No. ... 21313 — Operator ..... AB

STANDARD TEST METER			DRY TEST METER				
Press. dHs (in. H2O)	Temp. Ts (dF)	Volume Vs (ft3)	Press. dH (in. H2O)	Temp. Tdi (dF)	Temp. Tdo (dF)	Volume Vd (ft3)	Time t (min)
	68.0	391.523		83	82	1020.297	
-1.4	67.0	368.346	0.5	82	81	996.854	54.0
Avg/Net :	67.5	23.177			82	23.443	
	68.0	367.739		81	80	996.234	
-2.3	67.0	344.170	1.0	80	79	972.482	40.0
Avg/Net :	67.5	23.569			80	23.752	
	67.0	265.627		80	79	894.385	
-2.5	67.0	237.624	1.5	78	79	866.307	38.0
Avg/Net :	67.0	28.003			79	28.078	
	67.0	299.374		79	80	928.127	
-3.8	68.0	266.025	2.0	78	79	894.793	42.0
Avg/Net :	67.5	33.349			79	33.334	
	67.0	343.531		80	79	971.849	
-5.4	66.0	301.895	3.0	78	78	930.627	42.0
Avg/Net :	66.5	41.636			79	41.222	

$$y = Vs \times (Pbar + (dHs / 13.6)) \times (Avg.\ Td + 460) / [\ Vd \times (Pbar + (dH / 13.6)) \times (\ Ts + 460)]$$

$$Ko = [(Vs/t) \times [(Tdo + 460) / (Ts + 460)] \times [(Pbar + (dHs/13.6) / (Pbar + (dH/13.6)] / [((Tdo + 460) \times dH) / (Pbar + (dH/13.6)) \times (Mm)]^{0.5}$$

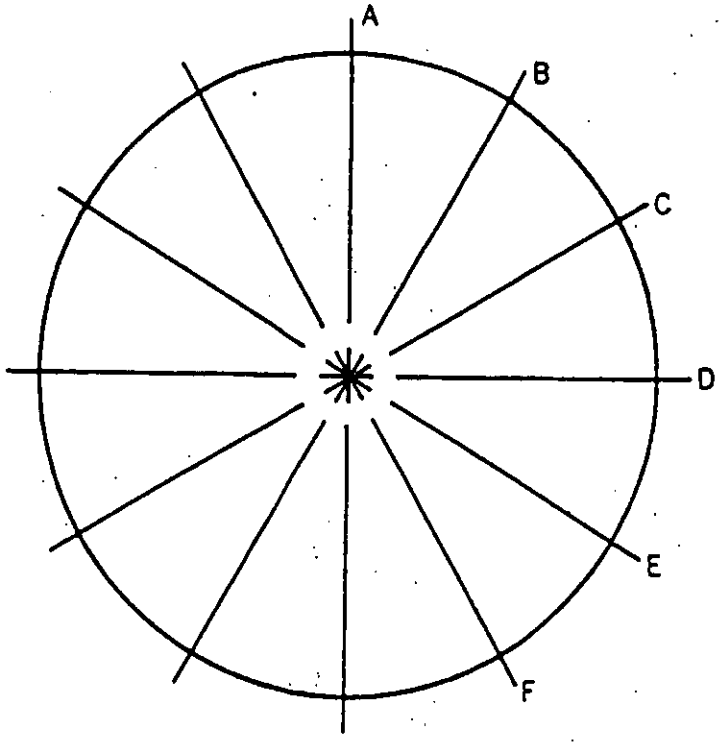
dH :	0.5	1.0	1.5	2.0	3.0	Avg.	Std.Dev.
y :	1.0111	1.0076	1.0100	1.0077	1.0123	1.0098	0.0019
Ko :	0.7845	0.7580	0.7735	0.7187	0.7295	0.7528	0.0252

y : 0.18 % Relative Std. Dev.

Ko : 3.34 % Relative Std. Dev.

Steiner Environmental, Inc.

NOZZLE CALIBRATION



DIAMETER (in.)

A 0.234

B 0.234

C 0.235

D 0.234

E _____

F _____

AVG. 0.2343

DATE 3-25-92

NOZZLE NO. #1458

OPERATOR SW

APPENDIX B

HARRIS WOOLF OPERATING DATA

HARRIS WOOLF
CALIFORNIA ALMONDS
Route 1, Box 470 • Coalinga, CA 93210 • Tel: 209-884-2147 Fax: 209-884-2746

To Stiener Environmental | Date 9/ /92
From Hortencia

- ☐ Reply and send me copy
- ☐ Take appropriate action
- ☐ For your signature
- ☒ For your information
- ☐ For your comments
- ☐ See me about this
- ☐ Note and file
- ☐ Note and return
- ☐ For your approval
- ☐ Please reply promptly
- ☐ As you requested
- ☐ Report on this

Comments: product done during test. total lbs 353,560 lbs.

Thank you,
Hortencia Solorio

Selectform, Inc., Box 3045, Freeport, NY 11520 Form 60—Printed in U.S.A.

44

HARRIS - WOOLF
CALIFORNIA ALMONDS

PRECLEANER LOG

DATE 9-14-92

ME START	TIME STOP	SCALE TICKET NUMBER	GROWER	FIELD	TANK NUMBER	INCOMING FIELDRUN LBS	COMMENTS	
6:35	8:30	2681	ATP	28-2	* 3	52,250		TEST RUN 1 13.8 TPH
8:35	10:24	2682	ATP	28-2	* 6	54,040		
10:34	12:20	2680	ATP	28-2	* 5	48,710		RUN 2 13.8 TPH
12:25	2:10	2685	ATP	28-1	* 1	57,650		RUN 3 15.6 TPH
2:20 pm	4:00 pm	2691	ATP	28-1	#5	51,570	plot of grass at Lower; Loader was not available;	
1:49 pm	6:24 pm	2694	Double D	NE 24	# 6	46,190	135 minutes - Dirt & grass	
	7 7:53 pm	2697	Double D	NE-24	# 1	46,290	Dirt & debris	*
8:24 pm	10:20	2693	Double D	NE-24	# 7	48,370	Dirt & dusty	
10:28	9 12:00 am	2656	Woolf Enter	Sec. 8 Blk. 4	# 6	60,000	Dirt & Twigs	
12:00 am	1:35 am	2638	Woolf Enter-	Sec. 8 Blk. 1	# 1	65,310	Dirt & a lot of Twigs	
	11						a lot of dirt & twigs	
	12							
	13							
	14							
	15							
	16							
	TOTAL TODAY	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	XXXXXXXXXX	527,240	XXXXXXXXXX	

* = END OF TEST

TOTAL LBS PLANNED 353,560

OPERATOR 1 Martin Esparza
-Day- Roque Ayala