SWEL

Trewithen Dairy
Greymare Farm
Lostwithiel
PL22 0LW

51.027142 -3.080726

Odour Impact Assessment

S19-505/OIA
October 2019

Prepared by :

Southwest Environmental Limited
80-83 Long Lane
London
EC1A 9ET

On behalf of :

Trewithen Dairy
Greymare Farm
Lostwithiel
PL22 0LW

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CONTENTS

1.0   Introduction

Acting on instruction from Trewithen Dairy, Southwest Environmental Limited are to prepare an Odour Impact Assessment, in conjunction with the proposed development at Land off Station Road.

1.1   The Site

The site currently comprises a grassed enclosure. A site Location Plans is included within **Appendix 1**.

Address	Trewithen Dairy Greymare Farm Lostwithiel
Postcode	PL22 0LW
Grid Reference	51.027142 -3.080726

1.2   Proposed Development

This assessment relates to a permit application. The site is an existing dairy. This assessment focusses on odour emissions from effluent treatment plant on site. The plant consists of a balance tank and a sequence batch reactor. Both are uncovered.

There are 3 other emission points on site, but they have not been included in the assessment. Firstly there are the 2 no. flues from the primary and secondary boilers. Secondarily there is the extract system from the dairy its self, which did not give off any discernible odour.

2.0   Terms of Reference

- H1 Part 1 – Environmental Risk Assessment
- Review of Dispersion Modelling for Odour Predictions (SC030170/SR3)
- Best Avalable Techniques (BAT) / BAT reference documents (BREFs)
- Odour Guidance for Local Authorities, Defra, March 2010
- Air quality guidelines for Europe, 1987 (WHO Regional Publications, European Series No. 23)
- Review of Odour Character and Thresholds (SC030170/SR2)
- Guidance on the Assessment of Odour for Planning – IAQM - May 2014

3.0   Dispersion of Odours

The Environment Agency Guidelines and findings from UKWIR use the 98th percentile hourly mean; this is the hourly mean odour concentration that is equalled or exceeded for 2% of the time period considered, which is typically one year. The use of the 98th percentile statistic allows for some consideration of both frequency and intensity of the odours.

It should be noted that a fluctuating odour is often more noticeable than a steady background odour at a low concentration. It is implicit that within the models hourly

averaging time and the Environment Agency guidelines and findings from UKWIR that there would be variation in the odour concentration around this mean i.e. there would be short periods when odour concentration would be higher than the mean and lower than the mean.

The FIDOR an often used acronym, is a reminder of the factors that will determine the degree of odour pollution

- Frequency of detection.
- Intensity as perceived.
- Duration of exposure.
- Offensiveness.
- Receptor sensitivity

4.0   Odour Assessment Framework

4.1   Odour Concentration

Odour concentration is expressed in terms of European Odour Units per metre cubed of air (ouE/m3). The following definitions and descriptions of how an odour might be perceived by a human with an average sense of smell may be useful, however, it should be noted that within a human population there is considerable variation in acuity of sense of smell.

- 1 ouE/m3 is defined as the limit of detection, in laboratory conditions.
- At 2.0 – 3.0 ouE/m3 a particular odour might be detected against background odours in an open environment.
- When the concentration reaches around 5.0 ouE/m3 a particular odour will usually be recognisable, if known, but would usually be described as faint.
- At 10.0 ouE/m3 most would describe the intensity of the odour as moderate or strong and if persistent, it is likely that the odour would become intrusive.

The character, or hedonic tone, of an odour is also important; typically odours are grouped into three categories;

 Most offensive;

- processes involving decaying animal or fish remains
- **processes involving septic effluent or sludge**
- biological landfill odours

 Moderately offensive;

- intensive livestock rearing
- fat frying (food processing)
- sugar beet processing
- well aerated green waste composting

 And less offensive

- brewery
- confectionery
- coffee roasting

- bakery

4.2 Environment Agency Guidelines

In April 2011, the Environment Agency published H4 Odour Management guidance (H4) which contains odour benchmarks. The benchmarks are;

- 1.5 ouE/m3 for most offensive odours.
- 3.0 ouE/m3 for moderately offensive odours
- 6.0 ouE/m3 for less offensive odours.

Any modelled results that project exposures above these benchmark levels, after taking uncertainty into account, indicates the likelihood of unacceptable odour pollution.

4.3 Defining Odour Emissions

Process explained below in term of odour sources, intensity, and mitigative features.

4.3.1 Sources

The source considered in this assessment is the Salisbury Sewage Treatment Works. Odour sources considered are shown in section 4.4.3.

4.3.2 Model Input Data

Data for the model is displayed in **Appendix 3**, and is set at legislative minima (such as required for permit) or is estimated based on the specification of the plant know at the time of writing.

4.3.3 Odour Emissions

4.3.3.1 Odour by Area

Secondary olfactory survey data was used in this study;

Refernce	Area Odour Emission Rate	Source	Source Area (Per Unit)	Type	Emmsion Rate EOU/s
UKWIR	20 ouE/m^2/s	1 x SBR	114 m^2	Continuous (24 hours)	2280
UKWIR	20 ouE/m2/s	1 x Balance Tank	95 m2	Continuous (24 hours)	1900

5.0 Modelling

Modelling is used to derive concentrations at various points, the below chapter explains the input values used. A full set of input values are included within **Appendix 3**.

5.1 Sources

There are various discrete sources that have been combined within the model to provide the overall odour emission rate.

5.1.1 Balance Tank

The batch reactor requires a balance tank, in order balance inputs. This is modelled as a 365 / 247 source. We have assumed a UKWIR value for Activated Sludge Process with Diffused Aeration as representation and added a 100% overage to account for uncertainty.

5.1.2 SBR

This is modelled as a 365 / 247 source. We have assumed a UKWIR value for Activated Sludge Process with Diffused Aeration as representation and added a 100% overage to account for uncertainty.

5.2 Pathway

The pathways were assessed using air dispersion modelling.

5.2.1 Software

Calculations were performed using BREEZE AERMOD. AERMOD is a steady-state Gaussian dispersion model that represents the current state-of-science and promulgated dispersion model from the U.S. EPA. BREEZE AERMOD is an enhanced version of the EPA-approved AERMOD that provides modellers with the tools and functionality required to perform air quality analyses that help to address both permitting, regulatory, and nuisance issues as well as perform academic research. BREEZE AERMOD/ISC offers the most complete air quality modelling system available on the market today.

5.2.2 Terrain

Terrain can influence the dispersion of airborne particulates and gases. Terrain data was not used as the area between source and receptor is largely flat and there is very little difference in height between the source and the receptor, we do not consider that terrain will meaningfully influence the odour pathway at this location.

5.2.3 Meteorology

Regional meteorological data was utilised for the study. Prevailing winds are perhaps the most important factor in the results of dispersion modelling. Data was extrapolated from historic records covering a representative 1 year period.

A surface roughness value of 0.03 was used, this is a conservative value, and will likely extend reach of plumes.

5.3 Receptors

Worst case discrete receptors were chosen on the far western boundary of the site. This is marked on the model plan within **Appendix 2**. Receptors were chosen to represent worst case situations in terms of proximity. Concentration at the site of the proposed dwellings will be lower than at the boundary.

6.0   Results

Results are show that the discrete receptors are subject to a 1 Hour 98th Percentile Odour Concentration of 0.07 OUE/m3.

7.0   Conclusions

The main odour sources at the proposed facility should be considered moderately offensive. Current guidance suggests the use of 98 Percentile Hourly mean concentrations, and the averaged concentrations over a period of 8760 hours would appear to be below guide values.

8.0   Certification

This report is produced for the sole use of the Client, and no responsibility of any kind, whether for negligence or otherwise, can be accepted for any Third Party who may rely upon it.

The conclusions and recommendations given in this report are based on our understanding of the future plans for the site. If, however, the site is developed for a more or less sensitive use, then a different interpretation might be appropriate. Information within this report should not be utilised in making of assumptions and judgements with regard to the financial value of land or property.

For the avoidance of doubt this report does not form a guarantee express or implied against negative impacts of odours or other emissions on persons, property or amenity value within or in the vicinity of the proposed site.

It necessarily relies on the co-operation of other organizations and the free availability of information and total access.

The scope of this Odour Impact Assessment was discussed and agreed with the Client. No responsibility is accepted for conditions not encountered, which are outside of the agreed scope of work.

This report may suggest an opinion regarding possible odour concentrations on site and in the vicinity of the site. However, this is for guidance only and no liability, whether negligent or otherwise, can be accepted for its accuracy.

APPENDIX 1

Location Plan

Greymare Farm
(Trewithen Dairy)

Tanks

Tank

Track

El Sub Sta

Pond

Trewithen Dairy
Draft Permit Boundary

154.0m

Slurry Bed

Solar Panels

nks
f
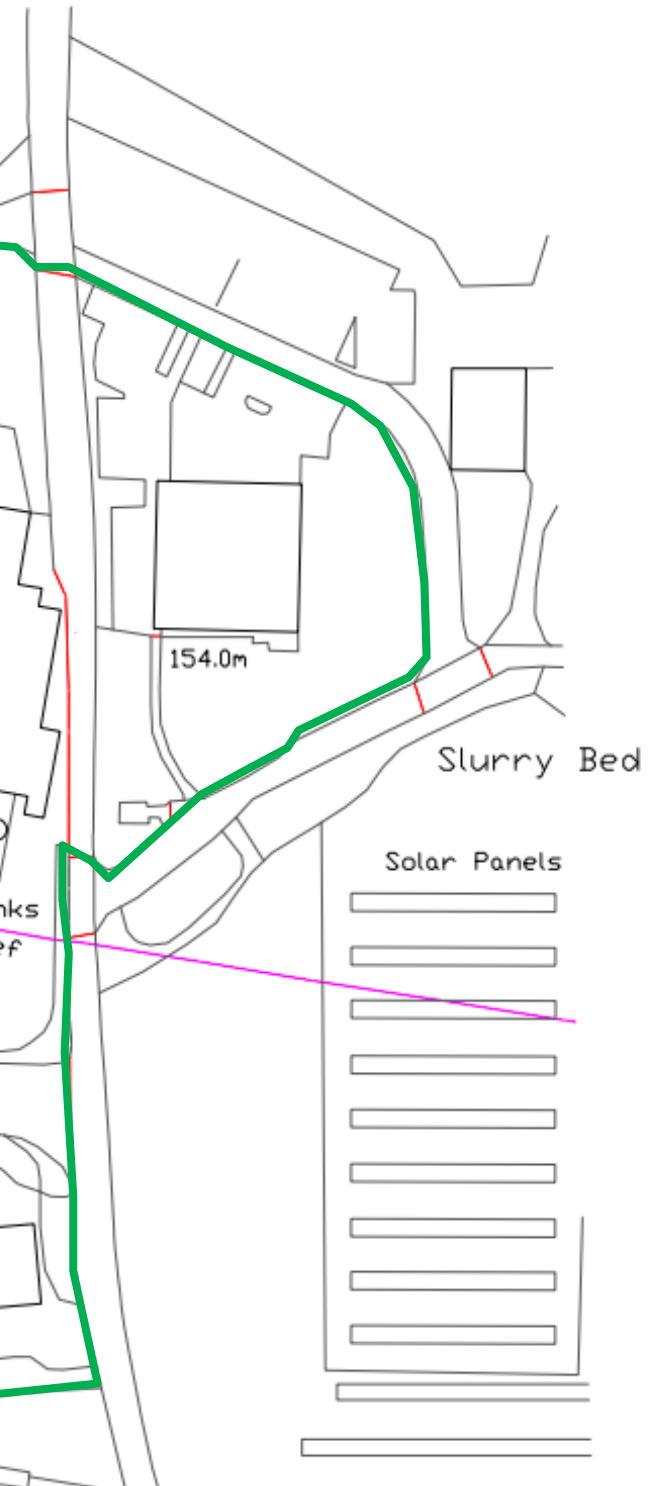
APPENDIX 2

Model Map

Model Map

Cross
= Receptor

Dot
= Source

Newbridge Wood

Adit

Middle Drift

Higher Drift

Penadlake Plantation

Lower Hollycoombe

Higher Hollycombe Farm   PSA15000

Penadlake Farm   PSA15001

Ford

173

Cumuli

167   Cumuli

W Spr

ranston

Grey Mare Plantations

Greymare Farm   PSA15004

Grey Mare (B Rock)

Solar Panels

Spr

159

Spr

PSA15003   Renna Coombe

Grey Mare's Colt (B Rock)

Cumuli

165

MS

Cumuli

Bofarnel Downs

155   Cumu

Tumulus

150

136

122

130

Bedwindle Farm   PSA15002   MS

Trewi

W

147   Ironmine Plantation

BS

Cumuli

Warren Plantation

Tumulus   131

125   131   140

500 meters

APPENDIX 3

Output Data

Percentile Report

Parameters:

  Source group = EFFLUENT
  Avg. period = 1 hour
  Period   = 2017/1/1/1 to 2017/12/31/24
  Avg. periods = 8760
  Percentiles = 98
  Scaling   = 1
  Translation = 0
  Units   = 1,EOU/S,EOU/M3

All Receptors:

            Corresponding   Receptor   Receptor   Maximum
Percentile Highest Value X-coord (m) Y-coord (m) Concentration
---------- ------------- ----------- ----------- -------------
98   176   1694.80   1724.10   .67072E-01

Individual Receptors:

Receptor   Receptor   Receptor Percentile > > >
Number   X-coord (m) Y-coord (m)   98
--------   ----------- ----------- ----------
1   1694.80   1724.10 .67072E-01
2   2072.20   1506.60 .51651E-01
3   1535.00   460.20 .26510E-01
4   722.60   898.50 .56746E-01

1   AERMOD PRIME - (DATED 15181)

                AERMODPrMSPx VERSION .0,   1.5);

**MODELOPTs: RegDFAULT CONC   ELEV   FLGPOL   RURAL

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***

(1=YES; 0=NO)

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

1 1 1 1 1 1 1 1 1 1 1 1 1 1 1

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***

(METERS/SEC)

1.54,   3.09,   5.14,   8.23, 10.80,

**MODELOPTs: RegDFAULT CONC   ELEV   FLGPOL   RURAL

                    *** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

 Surface file: C:\Users\WT\SWEL\JOBS\S1909D~1\METEOR~1\PURCHA~1\EGDY17~1\EGDY1718\EGDY17.SFC   Met Version: 19191

 Profile file: C:\Users\WT\SWEL\JOBS\S1909D~1\METEOR~1\PURCHA~1\EGDY17~1\EGDY1718\EGDY17.PFL

 Surface format: FREE

 Profile format: FREE

 Surface station no.:   3853   Upper air station no.:   3853

          Name: 1   Name: 1

          Year: 2017   Year: 2017

First 24 hours of scalar data

YR MO DY JDY HR   H0   U*   W* DT/DZ ZICNV ZIMCH M-O LEN   Z0 BOWEN ALBEDO REF WS WD   HT REF TA   HT

- -

17 01 01 1 01 -20.2 0.200 -9.000 -9.000 -999. 276.   44.1 0.03 0.73 1.00   3.10 221. 10.0 280.9   2.0

17 01 01 1 02 -23.6 0.234 -9.000 -9.000 -999. 360.   60.3 0.03 0.73 1.00   3.60 198. 10.0 280.9   2.0

17 01 01 1 03 -27.0 0.268 -9.000 -9.000 -999. 447.   79.1 0.03 0.73 1.00   4.10 184. 10.0 281.4   2.0

```
17 01 01  1 04 -23.5 0.234 -9.000 -9.000 -999. 361.   60.4 0.03  0.73  1.00   3.60 223.  10.0 282.0  2.0
17 01 01  1 05 -27.0 0.268 -9.000 -9.000 -999. 418.   79.1 0.03  0.73  1.00   4.10 213.  10.0 281.4  2.0
17 01 01  1 06 -27.0 0.268 -9.000 -9.000 -999. 447.   79.1 0.03  0.73  1.00   4.10 202.  10.0 281.4  2.0
17 01 01  1 07 -23.5 0.234 -9.000 -9.000 -999. 395.   60.4 0.03  0.73  1.00   3.60 195.  10.0 281.4  2.0
17 01 01  1 08 -23.5 0.234 -9.000 -9.000 -999. 395.   60.4 0.03  0.73  1.00   3.60 193.  10.0 281.4  2.0
17 01 01  1 09 -23.4 0.234 -9.000 -9.000 -999. 395.   60.4 0.03  0.73  0.71   3.60 187.  10.0 281.4  2.0
17 01 01  1 10 -13.6 0.202 -9.000 -9.000 -999. 583.   54.6 0.03  0.73  0.46   3.10 211.  10.0 282.0  2.0
17 01 01  1 11  15.8 0.260  0.682  0.005 724. 319. -101.0 0.03  0.73  0.35   3.60 224.  10.0 282.5  2.0
17 01 01  1 12  12.5 0.259  0.625  0.005 702. 316. -124.3 0.03  0.73  0.31   3.60 226.  10.0 282.5  2.0
17 01 01  1 13  30.3 0.640  1.047  0.005 1366. 1229. -780.2 0.11  0.73  0.30   7.20  13.  10.0 279.9  2.0
17 01 01  1 14  22.1 0.725  0.982  0.005 1543. 1482. -1555.9 0.11  0.73  0.33   8.20   9.  10.0 278.8  2.0
17 01 01  1 15   3.0 0.667  0.512  0.005 1630. 1309. -8888.0 0.05  0.73  0.40   8.80  32.  10.0 277.5  2.0
17 01 01  1 16 -51.6 0.612 -9.000 -9.000 -999. 1267.  412.4 0.05  0.73  0.57   8.20  44.  10.0 277.0  2.0
17 01 01  1 17 -62.3 0.610 -9.000 -9.000 -999. 1193.  409.6 0.05  0.73  1.00   8.20  31.  10.0 277.0  2.0
17 01 01  1 18 -54.7 0.535 -9.000 -9.000 -999. 819.  315.4 0.11  0.73  1.00   6.20  27.  10.0 277.0  2.0
17 01 01  1 19 -62.2 0.610 -9.000 -9.000 -999. 1194.  409.6 0.05  0.73  1.00   8.20  44.  10.0 277.5  2.0
17 01 01  1 20 -59.2 0.581 -9.000 -9.000 -999. 871.  370.8 0.11  0.73  1.00   6.70  27.  10.0 277.5  2.0
17 01 01  1 21 -54.6 0.536 -9.000 -9.000 -999. 704.  315.4 0.11  0.73  1.00   6.20  20.  10.0 277.5  2.0
17 01 01  1 22 -62.2 0.610 -9.000 -9.000 -999. 1194.  409.6 0.05  0.73  1.00   8.20  32.  10.0 277.5  2.0
17 01 01  1 23 -54.4 0.533 -9.000 -9.000 -999. 1005.  312.6 0.05  0.73  1.00   7.20  30.  10.0 277.0  2.0
17 01 01  1 24 -50.6 0.495 -9.000 -9.000 -999. 911.  269.0 0.05  0.73  1.00   6.70  30.  10.0 276.4  2.0
```

First hour of profile data

YR MO DY HR HEIGHT F WDIR   WSPD AMB_TMP sigmaA sigmaW sigmaV

17 01 01 01   10.0 1 221．   3.10   281.0   99.0 -99.00 -99.00

F indicates top of profile (=1) or below (=0)

**MODELOPTs: RegDFAULT CONC   ELEV   FLGPOL   RURAL

          *** THE PERIOD (8760 HRS) AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: EFFLUENT ***

             INCLUDING SOURCE(S):   P5A15004   , P5A15005   ,

             *** DISCRETE CARTESIAN RECEPTOR POINTS ***

          ** CONC OF ODOUR   IN EOU/M3   **

   X-COORD (M) Y-COORD (M)   CONC   X-COORD (M) Y-COORD (M)   CONC

- -

     1694.80   1724.10   0.00498   2072.20   1506.60   0.00400

     1535.00   460.20   0.00239   722.60   898.50   0.00432

**MODELOPTs: RegDFAULT CONC   ELEV   FLGPOL   RURAL

                *** THE   1ST HIGHEST 1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: EFFLUENT ***

                    INCLUDING SOURCE(S):   P5A15004   , P5A15005   ,

                        *** DISCRETE CARTESIAN RECEPTOR POINTS ***

                    ** CONC OF ODOUR   IN EOU/M3   **

   X-COORD (M) Y-COORD (M)   CONC   (YYMMDDHH)   X-COORD (M) Y-COORD (M)   CONC   (YYMMDDHH)

- -

     1694.80   1724.10   0.42239 (17061921)   2072.20   1506.60   0.24992 (17062124)

     1535.00   460.20   0.29528 (17061721)   722.60   898.50   0.35004 (17062822)

**MODELOPTs: RegDFAULT CONC   ELEV   FLGPOL   RURAL

                    *** THE MAXIMUM   1   1-HR AVERAGE CONCENTRATION   VALUES FOR SOURCE GROUP: EFFLUENT ***

                        INCLUDING SOURCE(S):   P5A15004   , P5A15005   ,

                        ** CONC OF ODOUR   IN EOU/M3   **

RANK   CONC   (YYMMDDHH) AT   RECEPTOR (XR,YR) OF TYPE   RANK   CONC   (YYMMDDHH) AT   RECEPTOR (XR,YR) OF TYPE
- -
   1.   0.42239 (17061921) AT (1694.80,   1724.10) DC

 *** RECEPTOR TYPES: GC = GRIDCART

               GP = GRIDPOLR

               DC = DISCCART

               DP = DISCPOLR

**MODELOPTs: RegDFAULT CONC   ELEV   FLGPOL   RURAL

                     *** THE SUMMARY OF MAXIMUM PERIOD (8760 HRS) RESULTS ***

                ** CONC OF ODOUR   IN EOU/M3   **

                                             NETWORK

GROUP ID   AVERAGE CONC   RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG) OF TYPE GRID-ID

- -

EFFLUENT 1ST HIGHEST VALUE IS   0.00498 AT (1694.80,   1724.10,   0.00,   0.00,   1.50) DC

     2ND HIGHEST VALUE IS   0.00432 AT (722.60,   898.50,   0.00,   0.00,   1.50) DC

     3RD HIGHEST VALUE IS   0.00400 AT (2072.20,   1506.60,   0.00,   0.00,   1.50) DC

     4TH HIGHEST VALUE IS   0.00239 AT (1535.00,   460.20,   0.00,   0.00,   1.50) DC

     5TH HIGHEST VALUE IS   0.00000 AT (0.00,   0.00,   0.00,   0.00,   0.00)

     6TH HIGHEST VALUE IS   0.00000 AT (0.00,   0.00,   0.00,   0.00,   0.00)

     7TH HIGHEST VALUE IS   0.00000 AT (0.00,   0.00,   0.00,   0.00,   0.00)

8TH HIGHEST VALUE IS   0.00000 AT (0.00,   0.00,   0.00,   0.00,   0.00)

9TH HIGHEST VALUE IS   0.00000 AT (0.00,   0.00,   0.00,   0.00,   0.00)

10TH HIGHEST VALUE IS   0.00000 AT (0.00,   0.00,   0.00,   0.00,   0.00)

*** RECEPTOR TYPES: GC = GRIDCART

GP = GRIDPOLR

DC = DISCCART

DP = DISCPOLR

**MODELOPTs: RegDFAULT CONC   ELEV   FLGPOL   RURAL

                          *** THE SUMMARY OF HIGHEST 1-HR RESULTS ***

                ** CONC OF ODOUR   IN EOU/M3   **

                            DATE   NETWORK

GROUP ID   AVERAGE CONC   (YYMMDDHH)   RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)   OF TYPE GRID-ID

- -

EFFLUENT HIGH   1ST HIGH VALUE IS   0.42239 ON 17061921: AT (1694.80,   1724.10,   0.00,   0.00,   1.50) DC

   *** RECEPTOR TYPES: GC = GRIDCART

              GP = GRIDPOLR

              DC = DISCCART

              DP = DISCPOLR

**MODELOPTs: RegDFAULT CONC   ELEV   FLGPOL   RURAL

*** Message Summary : AERMOD Model Execution ***

 --------- Summary of Total Messages --------

A Total of   0 Fatal Error Message(s)

A Total of   0 Warning Message(s)

A Total of   405 Informational Message(s)

A Total of   8760 Hours Were Processed

A Total of   113 Calm Hours Identified

A Total of   292 Missing Hours Identified (3.33 Percent)

   ******** FATAL ERROR MESSAGES ********

*** NONE ***

******** WARNING MESSAGES ********

*** NONE ***

****

*** AERMOD Finishes Successfully ***

****