



# Oaktree Environmental Limited

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**Cameron Murdoch**  
**Ellgia Limited**  
**Unit 7 Lancaster Way Business Park**  
**Ely**  
**Cambridgeshire**  
**CB6 3NW**

**Date:** 18 June 2019

**Our Ref:** 2176-4140-01

**Your Ref:**

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Dear Cameron

**RE: ASSESSMENT OF AIR EMISSIONS IMPACTS FROM BIOMASS BOILER AT ELLGIA LIMITED, WINTERTON ROAD, SCUNTHORPE**

Further to our recent communications, I am writing in response to the Environment Agency (EA) request for an assessment of impacts from residual emissions from the biomass boiler, as part of the Environmental Permit application for the waste operation at Ellgia Limited, Winterton Road, Scunthorpe.

The biomass boiler is regulated by the Local Authority under the provisions of a Part B Environmental Permit. As such, there should be no requirement for the boiler to be included within the waste permit, otherwise this then becomes dual regulated, which is not normal practice. However, as a Part B permit has been issued, this should provide adequate confirmation to the EA that risks/impacts have already been assessed as being acceptable by the relevant regulator.

In order to assist, I have enclosed extracts from the application documents that were submitted to the Local Authority as part of the Part B permit application. These include the assessment of air emissions impacts using AERSCREEN, together with a copy of the AERSCREEN input parameters. This provides confirmation that impacts from the boiler will not be significant. It should be noted that whilst AERSCREEN is a screening model, it can be considered a more detailed assessment than the H1 screening tool, since it is run using the AERMOD executable file, takes full account of building downwash, incorporates a worst case met data file and provides outputs at defined discrete distances from the process.

I trust that this provides sufficient information, but please do not hesitate to contact me should you have any queries.

Yours Sincerely

**Dr David Young BEng MSc**  
**Senior Consultant**

enc. AERSCREEN assessment and input parameters.



## 6 Potential Impacts on Environment

### 6.1 Overview

6.1.1 An assessment of potential environmental impacts (air) has been undertaken using AERSCREEN. AERSCREEN is an emissions screening model developed by the United States Environmental Protection Agency (USEPA)<sup>3</sup>, based upon AERMOD. AERSCREEN produces worst case estimates of resulting 1 hour mean concentrations from single emission sources. USEPA provide scaling factors for converting hourly mean concentrations to annual mean and 24-hour mean concentrations. The purpose of AERSCREEN is to output pollution concentration results which are equal to or greater than AERMOD. AERSCREEN provides worst case concentrations at 25m intervals from an emission source (and other discrete locations if required) and can take account of building downwash and terrain (if applicable). The model generates a worst-case set of meteorological conditions based on temperature, minimum wind speed and land use characteristics. Reference has been made to the USEPA User Guide for AERSCREEN<sup>4</sup> during completion of the assessment.

### 6.2 Method Used to Assess Potential Air Impacts

6.2.1 AERSCREEN has been used to predict the following:

- Maximum modelled ground level NO<sub>x</sub> concentration at closest sensitive receptors (residential receptors at distance of 716m from proposed boiler flue, off Glebe Road) to enable prediction of maximum impact on human receptors. NO<sub>x</sub> has been converted to NO<sub>2</sub> using worst case factors of 0.35 for hourly mean concentrations and 0.7 for annual mean concentrations, in accordance with the relevant guidance, to enable comparison with the NO<sub>2</sub> AQLVs;
- Maximum modelled ground level PM<sub>10</sub> and PM<sub>2.5</sub> concentration at closest sensitive receptors (to enable prediction of maximum impact on human

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<sup>3</sup> [http://www3.epa.gov/scram001/dispersion\\_screening.htm](http://www3.epa.gov/scram001/dispersion_screening.htm).  
<sup>4</sup> AERSCREEN User's Guide, USEPA, July 2015.

receptors) In accordance with relevant guidance<sup>5</sup>, it has been assumed that 80% of modelled particulate matter concentrations are comprised of PM<sub>10</sub> and 40% comprised as PM<sub>2.5</sub>;

- Maximum modelled annual mean ground level NO<sub>x</sub> concentration at distance of 1,600m (to enable assessment of impact on Risby Warren Site of Special Scientific Interest [SSSI]); and,
- Maximum Modelled annual mean and 24-hour mean PM<sub>10</sub> concentrations within Air Quality Management Area (AQMA). Closest point of AQMA scaled at 645m from site.

6.2.2 In order to assess potential air impacts, reference has been made to the air emissions risk assessment guidance on the government website<sup>6</sup>. The guidance indicates that potential impacts from a process can be considered insignificant if the following screening criteria are met:

- The long term process contribution is <1% of the long term environmental standard; and/or,
- The short term process contribution is <10% of the short term environmental standard.

6.2.3 The guidance also advises that more detailed assessment of emissions (modelling) for a process may be required if the following criteria are met:

- The long term process contribution + background concentration is >70% of the long term environmental standard; and/or
- The short term process contribution is >20% (Short term environmental standard minus twice annual mean background concentration).

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<sup>5</sup> Pollution Inventory Reporting – Combustion Activities Guidance Note, Environmental Permitting (England and Wales) Regulations 2010 Regulation 60(1), Version 4, EA, January 2013.

<sup>6</sup> <https://www.gov.uk/guidance/air-emissions-risk-assessment-for-your-environmental-permit>.

6.2.4 Reference has also been made to Institute of Air Quality Management (IAQM) guidance on assessment of air quality impacts<sup>7</sup>.

6.2.5 Reference should be made to the AERSCREEN output files in Appendix II, which contain details of all inputs and outputs for the model runs.

### 6.3 Background Pollutant Concentrations

6.3.1 In order to determine suitable background concentrations for use within this assessment, reference has been made to DEFRA mapped background pollutant mapping and monitoring data contained within the latest Air Quality Progress report for North Lincolnshire<sup>8</sup>.

6.3.2 The DEFRA website contains background pollutant mapping data for NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub>, and PM<sub>2.5</sub> on a 1km by 1km grid square basis across the UK. This data is routinely used for assessing background pollutant concentrations where no suitably representative air pollution monitoring data exists. The archive is maintained by AEA on behalf of DEFRA. NO<sub>x</sub>, NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> data is available for each grid square for the years 2013 to 2030. Table 3 contains background pollutant concentrations for the grid square containing the site. Table 4 contains data for grid square 492500, 413500, which contains Risby Warren SSSI.

**Table 3 Background Pollutant Mapping Data for Grid Square 490500, 412500**

Pollutant	2016 Annual Mean Concentration (µg.m <sup>-3</sup> )
NO <sub>2</sub>	15.18
PM <sub>10</sub>	16.16
PM <sub>2.5</sub>	10.97

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<sup>7</sup> Land-Use Planning & Development Control: Planning for Air Quality, IAQM, May 2015.

<sup>8</sup> 2015 Updating and Screening Assessment (USA) for North Lincolnshire Council, North Lincolnshire Council, January 2016.

**Table 4 Background Pollutant Mapping Data for Grid Square 491500, 413500**

Pollutant	2016 Annual Mean Concentration ( $\mu\text{g}\cdot\text{m}^{-3}$ )
NO <sub>x</sub>	19.41

6.3.3 Review of the 2015 USA for North Lincolnshire has also been undertaken to identify a potential source of background pollution data to use within this assessment. NO<sub>2</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> is monitored at a number of locations across Scunthorpe. However, no actual PM<sub>2.5</sub> data was presented in the 2015 USA. PM<sub>10</sub> and NO<sub>2</sub> monitoring data from the nearest locations to the site is presented in the tables below.

**Table 5 NO<sub>2</sub> Monitoring Results**

Monitoring Site	NGR (m)	Site Type	Monitored 2014 Annual Mean NO <sub>2</sub> Concentration ( $\mu\text{g}\cdot\text{m}^{-3}$ ) <sup>(a)</sup>
DT1 – Frodingham Road	489099, 411723	Diffusion Tube – Urban kerbside	31.1
DT4 – Britannia Corner	489190, 411285	Diffusion Tube – Urban roadside	32.2
DT5 – Oswald Road	489209, 411118	Diffusion Tube – Urban kerbside	31.4
Scunthorpe Town (AURN)	490320, 410831	Automated – Urban industrial	25.2
Low Santon	492945, 411931	Automated – industrial	16.3

**Table 6 PM<sub>10</sub> Monitoring Results**

Monitoring Site	NGR (m)	Site Type	Monitored 2014 Annual Mean PM <sub>10</sub> Concentration ( $\mu\text{g}\cdot\text{m}^{-3}$ ) <sup>(a)</sup>
Scunthorpe Town (FDMS)	490320, 419831	Urban industrial	21.2
Scunthorpe Town (TEOM)	490320, 419831	Urban industrial	21.5

Monitoring Site	NGR (m)	Site Type	Monitored 2014 Annual Mean PM <sub>10</sub> Concentration (µg.m <sup>-3</sup> ) <sup>(a)</sup>
East Common Lane	490663, 409789	Urban industrial	22.9
Low Santon (FDMS)	492945, 411931	Industrial	25.1
Low Santon (TEOM)	492945, 411931	Industrial	29.6
High Santon	492945, 411931	Industrial	25.97
Redbourn Club	490002, 410069	Urban	21.3
Lakeside	491750, 408127	Urban industrial	21.6
Church Square	489989, 411430	Urban industrial	26.3
High Street East	490224, 411301	Industrial	21.7

6.3.4 The following table details the back ground pollutant concentrations used in this assessment. For PM<sub>10</sub> and NO<sub>2</sub>, these are based on the highest reported concentrations from the nearest monitoring locations, which ensures a highly conservative, worst case assessment. Background NO<sub>x</sub> and PM<sub>2.5</sub> concentrations are based upon the DEFRA mapped background concentrations, in lieu of any specific monitoring data available.

**Table 7 Summary of Background Pollution Data Used in Assessment**

Pollutant	Annual Mean Background Concentration	Short Term Background Concentration <sup>(a)</sup>	Source of Background Data
NO <sub>x</sub>	19.41µg.m <sup>-3</sup>	N/A	DEFRA Background Mapping Data
NO <sub>2</sub>	32.3µg.m <sup>-3</sup>	64.6µg.m <sup>-3</sup>	LAQM Monitoring Data at Britannia Corner

Pollutant	Annual Mean Background Concentration	Short Term Background Concentration <sup>(a)</sup>	Source of Background Data
PM <sub>10</sub>	29.6µg.m <sup>-3</sup>	59.2µg.m <sup>-3</sup>	LAQM Monitoring Data at Low Santon
PM <sub>2.5</sub>	10.97µg.m <sup>-3</sup>	N/A	DEFRA Background Mapping Data

## 6.4 Air Quality Standards and Critical Levels

6.4.1 The Air Quality Limit Values, Target Values and Critical Levels Relevant to this assessment are presented in the table below.

**Table 8 Air Quality Limit Values, Target Values and Critical Levels**

Pollutant	Measured As	Purpose	Air Quality Standards
NO <sub>2</sub>	1-hour mean	Protection of human health	200µg.m <sup>-3</sup> (not to be exceeded more than 18 times per calendar year)
	Annual mean	Protection of human health	40µg.m <sup>-3</sup>
Particulate matter less than 10µm in aerodynamic diameter (PM <sub>10</sub> )	24-hour mean	Protection of human health	50µg.m <sup>-3</sup> (not to be exceeded more than 35 times per calendar year)
	Annual mean	Protection of human health	40µg.m <sup>-3</sup>
PM <sub>2.5</sub>	Annual mean	Protection of human health	25µg.m <sup>-3</sup>
NO <sub>x</sub>	Annual mean	Protection of vegetation	30µg.m <sup>-3</sup>

## 6.5 Scenarios Modelled

6.5.1 Two scenarios were modelled using AERSCREEN, a worst case scenario, assuming that the boiler would emit continuously at Emission Limit Value (ELV) levels and a 'normal' operation scenario based upon expected emission levels, obtained from a

monitoring exercise previously undertaken for the boiler<sup>9</sup>, a copy of which is included within Appendix V.

## 6.6 AERSCREEN Results

6.6.1 The following tables present the modelled pollutant concentrations at nearest sensitive receptors. Based upon worst case emissions, the process contribution to 24-hour mean and 1-hour mean NO<sub>2</sub> concentrations will be less than the screening criteria of 10% at the closest sensitive receptors, whilst the process contribution to annual mean PM<sub>2.5</sub> and PM<sub>10</sub> concentrations will be less than the screening criteria of 1%. As such, impacts from these emissions can be concluded to be insignificant, with no further assessment required. Although the screening criteria of 1% is exceeded for process contribution to annual mean NO<sub>x</sub> and annual mean NO<sub>2</sub> concentrations at the closest sensitive receptors, no exceedences of AQLVs or critical levels are predicted at sensitive receptor locations, based upon worst case emission levels and taking background concentrations into account and it can therefore be concluded that impacts will not be significant. Given that this assessment has been based upon conservative, worst case background concentrations, using a highly conservative screening model, and on the basis of the worst case assumption that the plant will emit continuously at ELV levels, there is a high level of confidence in the conclusions of this assessment.

**Table 9 AERSCREEN Results for Annual Mean NO<sub>2</sub> Concentrations Based on Worst Case Emissions**

Receptor	Modelled Process Contribution to Annual Mean NO <sub>2</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)	Resulting Annual Mean NO <sub>2</sub> concentrations (Process Contribution + Background) (µg.m <sup>-3</sup> )	Contribution of Resulting Annual Mean NO <sub>2</sub> Concentration to AQLV(%)
Closest Human Receptor (Distance of 716m from Site)	1.79	4.48	34.09	85.23

<sup>9</sup> Stack Emissions Testing Report for Arterm 999KW Boiler, Exova Catalyst, 25 August 2015.



**Table 10 AERSCREEN Results for 1-Hour Mean NO<sub>2</sub> Concentrations Based on Worst Case Emissions**

Receptor	Modelled Process Contribution to 1-Hour Mean NO <sub>2</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)
Closest Human Receptor (Distance of 716m from Site)	8.95	4.48

**Table 11 AERSCREEN Results for Annual Mean PM<sub>10</sub> Concentrations Based on Worst Case Emissions**

Receptor	Modelled Process Contribution to Annual Mean PM <sub>10</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)	Resulting Annual Mean PM <sub>10</sub> concentrations (Process Contribution + Background) (µg.m <sup>-3</sup> )	Contribution of Resulting Annual Mean PM <sub>10</sub> Concentration to AQLV(%)
Closest Human Receptor (Distance of 716m from Site)	0.31	0.78	29.91	74.78
AQMA (Closest Point - 645m from site)	0.32	0.8	29.92	74.8

**Table 12 AERSCREEN Results for 24-Hour Mean PM<sub>10</sub> Concentrations Based on Worst Case Emissions**

Receptor	Modelled Process Contribution to 24-Hour Mean PM <sub>10</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)
Closest Human Receptor (Distance of 716m from Site)	1.84	3.68
AQMA (Closest Point - 645m from site)	1.94	3.88

**Table 13 AERSCREEN Results for Annual Mean PM<sub>2.5</sub> Concentrations Based on Worst Case Emissions**

Receptor	Modelled Process Contribution to Annual Mean PM <sub>2.5</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)	Resulting Annual Mean PM <sub>2.5</sub> concentrations (Process Contribution + Background) (µg.m <sup>-3</sup> )	Contribution of Resulting Annual Mean PM <sub>2.5</sub> Concentration to AQLV(%)
Closest Human Receptor (Distance of 716m from Site)	0.15	0.6	11.12	44.48

**Table 14 AERSCREEN Results for Annual Mean NO<sub>x</sub> Concentrations at Risby Warren SSSI Based on Worst Case Emissions**

Receptor	Modelled Process Contribution to Annual Mean NO <sub>2</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)	Resulting Annual Mean NO <sub>2</sub> concentrations (Process Contribution + Background) (µg.m <sup>-3</sup> )	Contribution of Resulting Annual Mean NO <sub>2</sub> Concentration to AQLV(%)
Risby Warren SSSI	1.69	5.63	21.1	70.33

**Table 15 AERSCREEN Results for Annual Mean NO<sub>2</sub> Concentrations Based on Emissions Monitoring Data**

Receptor	Modelled Process Contribution to Annual Mean NO <sub>2</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)	Resulting Annual Mean NO <sub>2</sub> concentrations (Process Contribution + Background) (µg.m <sup>-3</sup> )	Contribution of Resulting Annual Mean NO <sub>2</sub> Concentration to AQLV(%)
Closest Human Receptor (Distance of 716m from Site)	0.67	1.68	32.97	82.43

**Table 16 AERSCREEN Results for 1-Hour Mean NO<sub>2</sub> Concentrations Based on Emissions Monitoring Data**

Receptor	Modelled Process Contribution to 1-Hour Mean NO <sub>2</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)
Closest Human Receptor (Distance of 716m from Site)	3.36	1.68

**Table 17 AERSCREEN Results for Annual Mean PM<sub>10</sub> Concentrations Based on Emission Monitoring Data**

Receptor	Modelled Process Contribution to Annual Mean PM <sub>10</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)	Resulting Annual Mean PM <sub>10</sub> concentrations (Process Contribution + Background) (µg.m <sup>-3</sup> )	Contribution of Resulting Annual Mean PM <sub>10</sub> Concentration to AQLV(%)
Closest Human Receptor (Distance of 716m from Site)	0.16	0.4	29.76	74.4
AQMA (Closest Point - 645m from site)	0.16	0.4	29.76	74.4

**Table 18 AERSCREEN Results for 24-Hour Mean PM<sub>10</sub> Concentrations Based on Emissions Monitoring Data**

Receptor	Modelled Process Contribution to 24-Hour Mean PM <sub>10</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)
Closest Human Receptor (Distance of 716m from Site)	0.94	1.88
AQMA (Closest Point - 645m from site)	0.99	1.98

**Table 19 AERSCREEN Results for Annual Mean PM<sub>2.5</sub> Concentrations Based on Emissions Monitoring Data**

Receptor	Modelled Process Contribution to Annual Mean PM <sub>2.5</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)	Resulting Annual Mean PM <sub>2.5</sub> concentrations (Process Contribution + Background) (µg.m <sup>-3</sup> )	Contribution of Resulting Annual Mean PM <sub>2.5</sub> Concentration to AQLV(%)
Closest Human Receptor (Distance of 716m from Site)	0.078	0.31	11.05	44.2

**Table 20 AERSCREEN Results for Annual Mean NO<sub>x</sub> Concentration at Risby Warren SSSI Based on Emission Monitoring Data**

Receptor	Modelled Process Contribution to Annual Mean NO <sub>2</sub> Concentration (µg.m <sup>-3</sup> )	Process Contribution to AQLV (%)	Resulting Annual Mean NO <sub>2</sub> concentrations (Process Contribution + Background) (µg.m <sup>-3</sup> )	Contribution of Resulting Annual Mean NO <sub>2</sub> Concentration to AQLV(%)
Risby Warren SSSI	0.64	2.13	20.05	66.83

PART B PERMIT APPLICATION SUPPORTING  
INFORMATION, APPENDIX II - AERSCREEN INPUT  
AND OUTPUT PARAMETERS

Particulate\_Matter\_Worst Case.out

AERSCREEN 15181 / AERMOD 15181

10/11/16  
14:55:32

TITLE: WINTERTON ROAD

\*\*\*\*\* STACK PARAMETERS \*\*\*\*\*

SOURCE EMISSION RATE:	0.0430 g/s	0.341 lb/hr
STACK HEIGHT:	10.98 meters	36.01 feet
STACK INNER DIAMETER:	0.350 meters	13.78 inches
PLUME EXIT TEMPERATURE:	393.0 K	247.7 Deg F
PLUME EXIT VELOCITY:	6.970 m/s	22.87 ft/s
STACK AIR FLOW RATE:	1421 ACFM	
RURAL OR URBAN:	RURAL	

INITIAL PROBE DISTANCE =                    5000. meters                    16404. feet

\*\*\*\*\* BUILDING DOWNWASH PARAMETERS \*\*\*\*\*

USER DEFINED BPIPPRM INPUT FILE:        3572.BPI

MAXIMUM BUILDING HEIGHT:	9.2 meters	30.2 feet
MAXIMUM BUILDING LENGTH:	16.5 meters	54.2 feet
MINIMUM BUILDING WIDTH:	7.7 meters	25.4 feet

\*\*\*\*\* FLOW SECTOR ANALYSIS \*\*\*\*\*  
25 meter receptor spacing: 1. meters - 5000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAX 1-HR CONC	DIST (m)	TEMPORAL PERIOD
10	15.72	8.24	-1.68	-3.77	30.37	25.0	ANN
20	15.53	7.74	-0.81	-3.29	28.18	125.0	ANN
30	16.27	10.15	-1.49	-2.71	29.98	125.0	ANN
40	16.52	12.26	-2.13	-2.04	32.08	100.0	ANN
50	16.26	14.00	-2.70	-1.32	43.11	25.0	ANN
60	15.51	15.31	-3.19	-0.55	53.48	25.0	ANN
70	14.29	16.15	-3.59	0.23	59.99	25.0	ANN
80*	12.64	16.51	-3.87	1.01	63.74	25.0	ANN
90	10.60	16.36	-4.04	1.75	47.97	25.0	ANN
100	8.24	15.72	-4.08	2.44	18.48	1.0	ANN
110	7.74	15.53	-4.48	3.06	17.40	1.0	ANN
120	10.15	16.27	-5.43	3.59	31.75	50.0	ANN
130	12.26	16.52	-6.22	4.00	37.93	25.0	ANN
140	14.00	16.26	-6.81	4.30	39.39	25.0	ANN
150	15.31	15.51	-7.21	4.46	35.02	25.0	ANN
160	16.15	14.29	-7.38	4.49	34.16	75.0	ANN
170	16.51	12.64	-7.32	4.38	34.37	100.0	ANN
180	16.36	10.60	-7.05	4.14	35.73	100.0	ANN

Particulate\_Matter\_worst Case.out

190	15.72	8.24	-6.56	3.77	36.26	100.0	ANN
200	15.53	7.74	-6.93	3.29	36.04	100.0	ANN
210	16.27	10.15	-8.66	2.71	32.83	125.0	ANN
220	16.52	12.26	-10.13	2.04	31.59	125.0	ANN
230	16.26	14.00	-11.30	1.32	30.11	125.0	ANN
240	15.51	15.31	-12.11	0.55	29.20	125.0	ANN
250	14.29	16.15	-12.57	-0.23	29.75	100.0	ANN
260	12.64	16.51	-12.63	-1.01	28.97	100.0	ANN
270	10.60	16.36	-12.32	-1.75	29.78	100.0	ANN
280	8.24	15.72	-11.63	-2.44	29.90	100.0	ANN
290	7.74	15.53	-11.05	-3.06	29.65	100.0	ANN
300	10.15	16.27	-10.84	-3.59	31.92	100.0	ANN
310	12.26	16.52	-10.30	-4.00	32.67	100.0	ANN
320	14.00	16.26	-9.45	-4.30	32.98	100.0	ANN
330	15.31	15.51	-8.31	-4.46	33.47	75.0	ANN
340	16.15	14.29	-6.92	-4.49	34.69	75.0	ANN
350	16.51	12.64	-5.31	-4.38	38.16	25.0	ANN
360	16.36	10.60	-3.55	-4.14	35.48	100.0	ANN

\* = worst case flow sector

\*\*\*\*\* MAKEMET METEOROLOGY PARAMETERS \*\*\*\*\*

MIN/MAX TEMPERATURE: 250.0 / 310.0 (K)  
 MINIMUM WIND SPEED: 0.5 m/s  
 ANEMOMETER HEIGHT: 10.000 meters  
 SURFACE CHARACTERISTICS INPUT: aersurface.out  
 DOMINANT SECTOR: 9 (240 270)  
 ALBEDO: 0.18  
 BOWEN RATIO: 0.78  
 ROUGHNESS LENGTH: 0.743 (meters)

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR MO DY JDY HR  
 -- -- -- -- --  
 10 09 10 10 12

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O	LEN	Z0	BOWEN	ALBEDO	REF	WS
62.30	0.492	0.600	0.020	132.	794.	-182.2	0.743	0.78	0.18	3.00		

HT REF TA HT  
 -- -- -- -- --  
 10.0 310.0 2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 3.1 m/s  
 STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 11.0 meters  
 ESTIMATED FINAL PLUME RISE (non-downwash): 4.4 meters  
 ESTIMATED FINAL PLUME HEIGHT (non-downwash): 15.4 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR MO DY JDY HR  
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 10 04 03 10 01

Particulate\_Matter\_Worst Case.out

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O	LEN	Z0	BOWEN	ALBEDO	REF	WS
-12.06	0.121	-9.000	0.020	-999.	97.	14.0	0.366	0.78	0.18	2.00		
HT	REF	TA	HT									
10.0	310.0	2.0										

WIND SPEED AT STACK HEIGHT (non-downwash): 2.0 m/s  
 STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 11.0 meters  
 ESTIMATED FINAL PLUME RISE (non-downwash): 6.3 meters  
 ESTIMATED FINAL PLUME HEIGHT (non-downwash): 17.3 meters

\*\*\*\*\* AERSCREEN AUTOMATED DISTANCES \*\*\*\*\*  
 OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)
1.00	31.69	2500.00	1.846
25.00	63.74	2525.00	1.831
50.00	32.81	2550.00	1.816
75.00	36.82	2575.00	1.801
100.00	36.26	2600.00	1.787
125.00	34.26	2625.00	1.772
150.00	31.40	2650.00	1.758
175.00	28.88	2675.00	1.744
200.00	25.68	2700.00	1.730
225.00	22.52	2725.00	1.716
250.00	19.46	2750.00	1.702
275.00	16.57	2775.00	1.689
300.00	14.28	2800.00	1.675
325.00	12.81	2825.00	1.662
350.00	11.40	2850.00	1.649
375.00	10.05	2875.00	1.636
400.00	8.785	2900.00	1.623
425.00	7.618	2925.00	1.610
450.00	6.545	2950.00	1.598
475.00	5.596	2975.00	1.586
500.00	5.255	3000.00	1.573
525.00	4.960	3025.00	1.561
550.00	4.703	3050.00	1.549
575.00	4.476	3075.00	1.538
600.00	4.275	3100.00	1.531
625.00	4.113	3125.00	1.524
645.00	4.037	3150.00	1.517
650.00	4.019	3175.00	1.510
675.00	3.942	3200.00	1.503
700.00	3.877	3225.00	1.496
716.00	3.843	3250.00	1.489
725.00	3.824	3275.00	1.482
750.00	3.774	3300.00	1.475
775.00	3.724	3325.00	1.469
800.00	3.685	3350.00	1.462
825.00	3.644	3375.00	1.455
850.00	3.601	3400.00	1.448
875.00	3.557	3425.00	1.441
900.00	3.511	3450.00	1.434
925.00	3.464	3475.00	1.427
950.00	3.416	3500.00	1.421
975.00	3.368	3525.00	1.414

Particulate_Matter_Worst Case.out			
1000.00	3.320	3550.00	1.407
1025.00	3.271	3575.00	1.400
1050.00	3.222	3600.00	1.394
1075.00	3.174	3625.00	1.387
1100.00	3.144	3650.00	1.381
1125.00	3.113	3675.00	1.375
1150.00	3.082	3700.00	1.369
1175.00	3.050	3725.00	1.363
1200.00	3.018	3750.00	1.357
1225.00	2.985	3775.00	1.351
1250.00	2.952	3800.00	1.345
1275.00	2.919	3825.00	1.339
1300.00	2.886	3850.00	1.333
1325.00	2.853	3875.00	1.327
1350.00	2.820	3900.00	1.322
1375.00	2.788	3925.00	1.316
1400.00	2.758	3950.00	1.310
1425.00	2.727	3975.00	1.305
1450.00	2.697	4000.00	1.300
1475.00	2.668	4025.00	1.295
1500.00	2.642	4050.00	1.290
1525.00	2.616	4075.00	1.286
1550.00	2.591	4100.00	1.281
1575.00	2.566	4125.00	1.276
1600.00	2.541	4150.00	1.271
1625.00	2.518	4175.00	1.266
1650.00	2.494	4200.00	1.262
1675.00	2.470	4225.00	1.257
1700.00	2.447	4250.00	1.252
1725.00	2.423	4275.00	1.247
1750.00	2.400	4300.00	1.243
1775.00	2.376	4325.00	1.238
1800.00	2.353	4350.00	1.233
1825.00	2.330	4375.00	1.228
1850.00	2.308	4400.00	1.224
1875.00	2.285	4425.00	1.219
1900.00	2.263	4450.00	1.214
1925.00	2.241	4475.00	1.210
1950.00	2.219	4500.00	1.205
1975.00	2.198	4525.00	1.200
2000.00	2.180	4550.00	1.196
2025.00	2.161	4575.00	1.191
2050.00	2.143	4600.00	1.187
2075.00	2.125	4625.00	1.182
2100.00	2.106	4650.00	1.178
2125.00	2.088	4675.00	1.173
2150.00	2.071	4700.00	1.169
2175.00	2.054	4725.00	1.164
2200.00	2.037	4750.00	1.160
2225.00	2.020	4775.00	1.155
2250.00	2.004	4800.00	1.151
2275.00	1.987	4825.00	1.146
2300.00	1.971	4850.00	1.142
2325.00	1.955	4875.00	1.138
2350.00	1.939	4900.00	1.133
2375.00	1.923	4925.00	1.129
2400.00	1.907	4950.00	1.124
2425.00	1.892	4975.00	1.120
2450.00	1.876	5000.00	1.116
2475.00	1.861		

\*\*\*\*\* AERSCREEN MAXIMUM IMPACT SUMMARY \*\*\*\*\*

MAXIMUM            SCALED            SCALED            SCALED            SCALED



CALCULATION PROCEDURE	Particulate_Matter_Worst Case.out				
	1-HOUR CONC (ug/m3)	3-HOUR CONC (ug/m3)	8-HOUR CONC (ug/m3)	24-HOUR CONC (ug/m3)	ANNUAL CONC (ug/m3)
FLAT TERRAIN	65.32	65.32	58.79	39.19	6.532
DISTANCE FROM SOURCE	13.00 meters directed toward 80 degrees				
IMPACT AT THE AMBIENT BOUNDARY	31.69	31.69	28.52	19.01	3.169
DISTANCE FROM SOURCE	1.00 meters directed toward 190 degrees				

Particulate\_Matter\_Actual.out

AERSCREEN 15181 / AERMOD 15181

10/11/16  
14:59:37

TITLE: WINTERTON ROAD

\*\*\*\*\* STACK PARAMETERS \*\*\*\*\*

SOURCE EMISSION RATE: 0.0219 g/s 0.174 lb/hr  
 STACK HEIGHT: 10.98 meters 36.01 feet  
 STACK INNER DIAMETER: 0.350 meters 13.78 inches  
 PLUME EXIT TEMPERATURE: 393.0 K 247.7 Deg F  
 PLUME EXIT VELOCITY: 6.970 m/s 22.87 ft/s  
 STACK AIR FLOW RATE: 1421 ACFM  
 RURAL OR URBAN: RURAL

INITIAL PROBE DISTANCE = 5000. meters 16404. feet

\*\*\*\*\* BUILDING DOWNWASH PARAMETERS \*\*\*\*\*

USER DEFINED BPIPPRM INPUT FILE: 3572.BPI

MAXIMUM BUILDING HEIGHT: 9.2 meters 30.2 feet  
 MAXIMUM BUILDING LENGTH: 16.5 meters 54.2 feet  
 MINIMUM BUILDING WIDTH: 7.7 meters 25.4 feet

\*\*\*\*\* FLOW SECTOR ANALYSIS \*\*\*\*\*  
 25 meter receptor spacing: 1. meters - 5000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAX 1-HR CONC	DIST (m)	TEMPORAL PERIOD
10	15.72	8.24	-1.68	-3.77	15.47	25.0	ANN
20	15.53	7.74	-0.81	-3.29	14.35	125.0	ANN
30	16.27	10.15	-1.49	-2.71	15.27	125.0	ANN
40	16.52	12.26	-2.13	-2.04	16.34	100.0	ANN
50	16.26	14.00	-2.70	-1.32	21.96	25.0	ANN
60	15.51	15.31	-3.19	-0.55	27.24	25.0	ANN
70	14.29	16.15	-3.59	0.23	30.55	25.0	ANN
80*	12.64	16.51	-3.87	1.01	32.46	25.0	ANN
90	10.60	16.36	-4.04	1.75	24.43	25.0	ANN
100	8.24	15.72	-4.08	2.44	9.410	1.0	ANN
110	7.74	15.53	-4.48	3.06	8.863	1.0	ANN
120	10.15	16.27	-5.43	3.59	16.17	50.0	ANN
130	12.26	16.52	-6.22	4.00	19.32	25.0	ANN
140	14.00	16.26	-6.81	4.30	20.06	25.0	ANN
150	15.31	15.51	-7.21	4.46	17.84	25.0	ANN
160	16.15	14.29	-7.38	4.49	17.40	75.0	ANN
170	16.51	12.64	-7.32	4.38	17.51	100.0	ANN
180	16.36	10.60	-7.05	4.14	18.20	100.0	ANN

	Particulate_Matter_Actual.out							
190	15.72	8.24	-6.56	3.77	18.47	100.0	ANN	
200	15.53	7.74	-6.93	3.29	18.36	100.0	ANN	
210	16.27	10.15	-8.66	2.71	16.72	125.0	ANN	
220	16.52	12.26	-10.13	2.04	16.09	125.0	ANN	
230	16.26	14.00	-11.30	1.32	15.33	125.0	ANN	
240	15.51	15.31	-12.11	0.55	14.87	125.0	ANN	
250	14.29	16.15	-12.57	-0.23	15.15	100.0	ANN	
260	12.64	16.51	-12.63	-1.01	14.75	100.0	ANN	
270	10.60	16.36	-12.32	-1.75	15.17	100.0	ANN	
280	8.24	15.72	-11.63	-2.44	15.23	100.0	ANN	
290	7.74	15.53	-11.05	-3.06	15.10	100.0	ANN	
300	10.15	16.27	-10.84	-3.59	16.26	100.0	ANN	
310	12.26	16.52	-10.30	-4.00	16.64	100.0	ANN	
320	14.00	16.26	-9.45	-4.30	16.80	100.0	ANN	
330	15.31	15.51	-8.31	-4.46	17.05	75.0	ANN	
340	16.15	14.29	-6.92	-4.49	17.67	75.0	ANN	
350	16.51	12.64	-5.31	-4.38	19.43	25.0	ANN	
360	16.36	10.60	-3.55	-4.14	18.07	100.0	ANN	

\* = worst case flow sector

\*\*\*\*\* MAKEMET METEOROLOGY PARAMETERS \*\*\*\*\*

MIN/MAX TEMPERATURE: 250.0 / 310.0 (K)  
 MINIMUM WIND SPEED: 0.5 m/s  
 ANEMOMETER HEIGHT: 10.000 meters  
 SURFACE CHARACTERISTICS INPUT: aersurface.out  
 DOMINANT SECTOR: 9 (240 270)  
 ALBEDO: 0.18  
 BOWEN RATIO: 0.78  
 ROUGHNESS LENGTH: 0.743 (meters)

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR MO DY JDY HR  
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 10 09 10 10 12

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O	LEN	Z0	BOWEN	ALBEDO	REF	WS
62.30	0.492	0.600	0.020	132.	794.	-182.2	0.743	0.78	0.18	3.00		

HT REF TA HT  
 -- -- -- -- --  
 10.0 310.0 2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 3.1 m/s  
 STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 11.0 meters  
 ESTIMATED FINAL PLUME RISE (non-downwash): 4.4 meters  
 ESTIMATED FINAL PLUME HEIGHT (non-downwash): 15.4 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR MO DY JDY HR  
 -- -- -- -- --  
 10 04 03 10 01

Particulate\_Matter\_Actual.out

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O	LEN	Z0	BOWEN	ALBEDO	REF	WS
-12.06	0.121	-9.000	0.020	-999.	97.		14.0	0.366	0.78	0.18		2.00
HT	REF	TA	HT									
10.0	310.0		2.0									

WIND SPEED AT STACK HEIGHT (non-downwash): 2.0 m/s  
 STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 11.0 meters  
 ESTIMATED FINAL PLUME RISE (non-downwash): 6.3 meters  
 ESTIMATED FINAL PLUME HEIGHT (non-downwash): 17.3 meters

\*\*\*\*\* AERSCREEN AUTOMATED DISTANCES \*\*\*\*\*  
 OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)
1.00	16.14	2500.00	0.9400
25.00	32.46	2525.00	0.9324
50.00	16.71	2550.00	0.9248
75.00	18.75	2575.00	0.9173
100.00	18.47	2600.00	0.9099
125.00	17.45	2625.00	0.9025
150.00	15.99	2650.00	0.8953
175.00	14.71	2675.00	0.8881
200.00	13.08	2700.00	0.8810
225.00	11.47	2725.00	0.8739
250.00	9.913	2750.00	0.8669
275.00	8.440	2775.00	0.8600
300.00	7.273	2800.00	0.8532
325.00	6.524	2825.00	0.8465
350.00	5.805	2850.00	0.8398
375.00	5.120	2875.00	0.8332
400.00	4.474	2900.00	0.8267
425.00	3.880	2925.00	0.8202
450.00	3.333	2950.00	0.8138
475.00	2.850	2975.00	0.8075
500.00	2.677	3000.00	0.8012
525.00	2.526	3025.00	0.7951
550.00	2.395	3050.00	0.7890
575.00	2.280	3075.00	0.7833
600.00	2.177	3100.00	0.7798
625.00	2.095	3125.00	0.7762
645.00	2.056	3150.00	0.7727
650.00	2.047	3175.00	0.7691
675.00	2.007	3200.00	0.7656
700.00	1.975	3225.00	0.7620
716.00	1.957	3250.00	0.7585
725.00	1.948	3275.00	0.7550
750.00	1.922	3300.00	0.7514
775.00	1.897	3325.00	0.7479
800.00	1.877	3350.00	0.7444
825.00	1.856	3375.00	0.7409
850.00	1.834	3400.00	0.7374
875.00	1.812	3425.00	0.7339
900.00	1.788	3450.00	0.7304
925.00	1.764	3475.00	0.7270
950.00	1.740	3500.00	0.7235
975.00	1.715	3525.00	0.7201

Particulate\_Matter\_Actual.out

1000.00	1.691	3550.00	0.7167
1025.00	1.666	3575.00	0.7132
1050.00	1.641	3600.00	0.7098
1075.00	1.616	3625.00	0.7064
1100.00	1.601	3650.00	0.7031
1125.00	1.586	3675.00	0.7001
1150.00	1.570	3700.00	0.6971
1175.00	1.553	3725.00	0.6940
1200.00	1.537	3750.00	0.6910
1225.00	1.520	3775.00	0.6880
1250.00	1.504	3800.00	0.6850
1275.00	1.487	3825.00	0.6820
1300.00	1.470	3850.00	0.6790
1325.00	1.453	3875.00	0.6760
1350.00	1.436	3900.00	0.6731
1375.00	1.420	3925.00	0.6701
1400.00	1.404	3950.00	0.6672
1425.00	1.389	3975.00	0.6646
1450.00	1.374	4000.00	0.6621
1475.00	1.359	4025.00	0.6597
1500.00	1.346	4050.00	0.6572
1525.00	1.332	4075.00	0.6547
1550.00	1.319	4100.00	0.6523
1575.00	1.307	4125.00	0.6498
1600.00	1.294	4150.00	0.6474
1625.00	1.282	4175.00	0.6450
1650.00	1.270	4200.00	0.6425
1675.00	1.258	4225.00	0.6401
1700.00	1.246	4250.00	0.6377
1725.00	1.234	4275.00	0.6352
1750.00	1.222	4300.00	0.6328
1775.00	1.210	4325.00	0.6304
1800.00	1.199	4350.00	0.6280
1825.00	1.187	4375.00	0.6256
1850.00	1.175	4400.00	0.6232
1875.00	1.164	4425.00	0.6209
1900.00	1.152	4450.00	0.6185
1925.00	1.141	4475.00	0.6161
1950.00	1.130	4500.00	0.6138
1975.00	1.120	4525.00	0.6114
2000.00	1.110	4550.00	0.6091
2025.00	1.101	4575.00	0.6067
2050.00	1.091	4600.00	0.6044
2075.00	1.082	4625.00	0.6021
2100.00	1.073	4650.00	0.5998
2125.00	1.064	4675.00	0.5975
2150.00	1.055	4700.00	0.5952
2175.00	1.046	4725.00	0.5929
2200.00	1.037	4750.00	0.5906
2225.00	1.029	4775.00	0.5883
2250.00	1.020	4800.00	0.5861
2275.00	1.012	4825.00	0.5838
2300.00	1.004	4850.00	0.5816
2325.00	0.9956	4875.00	0.5793
2350.00	0.9874	4900.00	0.5771
2375.00	0.9794	4925.00	0.5749
2400.00	0.9714	4950.00	0.5727
2425.00	0.9634	4975.00	0.5705
2450.00	0.9555	5000.00	0.5683
2475.00	0.9477		

\*\*\*\*\* AERSCREEN MAXIMUM IMPACT SUMMARY \*\*\*\*\*

MAXIMUM            SCALED            SCALED            SCALED            SCALED

CALCULATION PROCEDURE	Particulate_Matter_Actual.out				
	1-HOUR CONC (ug/m3)	3-HOUR CONC (ug/m3)	8-HOUR CONC (ug/m3)	24-HOUR CONC (ug/m3)	ANNUAL CONC (ug/m3)
FLAT TERRAIN	33.27	33.27	29.94	19.96	3.327
DISTANCE FROM SOURCE	13.00 meters directed toward 80 degrees				
IMPACT AT THE AMBIENT BOUNDARY	16.14	16.14	14.53	9.684	1.614
DISTANCE FROM SOURCE	1.00 meters directed toward 190 degrees				

AERSCREEN 15181 / AERMOD 15181

10/11/16  
14:51:00

TITLE: WINTERTON ROAD

\*\*\*\*\* STACK PARAMETERS \*\*\*\*\*

SOURCE EMISSION RATE: 0.2860 g/s 2.270 lb/hr  
 STACK HEIGHT: 10.98 meters 36.01 feet  
 STACK INNER DIAMETER: 0.350 meters 13.78 inches  
 PLUME EXIT TEMPERATURE: 393.0 K 247.7 Deg F  
 PLUME EXIT VELOCITY: 6.970 m/s 22.87 ft/s  
 STACK AIR FLOW RATE: 1421 ACFM  
 RURAL OR URBAN: RURAL

INITIAL PROBE DISTANCE = 5000. meters 16404. feet

\*\*\*\*\* BUILDING DOWNWASH PARAMETERS \*\*\*\*\*

USER DEFINED BPIPRM INPUT FILE: 3572.BPI

MAXIMUM BUILDING HEIGHT: 9.2 meters 30.2 feet  
 MAXIMUM BUILDING LENGTH: 16.5 meters 54.2 feet  
 MINIMUM BUILDING WIDTH: 7.7 meters 25.4 feet

\*\*\*\*\* FLOW SECTOR ANALYSIS \*\*\*\*\*  
 25 meter receptor spacing: 1. meters - 5000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAX 1-HR CONC	DIST (m)	TEMPORAL PERIOD
10	15.72	8.24	-1.68	-3.77	202.0	25.0	ANN
20	15.53	7.74	-0.81	-3.29	187.4	125.0	ANN
30	16.27	10.15	-1.49	-2.71	199.4	125.0	ANN
40	16.52	12.26	-2.13	-2.04	213.4	100.0	ANN
50	16.26	14.00	-2.70	-1.32	286.7	25.0	ANN
60	15.51	15.31	-3.19	-0.55	355.7	25.0	ANN
70	14.29	16.15	-3.59	0.23	399.0	25.0	ANN
80*	12.64	16.51	-3.87	1.01	423.9	25.0	ANN
90	10.60	16.36	-4.04	1.75	319.0	25.0	ANN
100	8.24	15.72	-4.08	2.44	122.9	1.0	ANN
110	7.74	15.53	-4.48	3.06	115.7	1.0	ANN
120	10.15	16.27	-5.43	3.59	211.1	50.0	ANN
130	12.26	16.52	-6.22	4.00	252.3	25.0	ANN
140	14.00	16.26	-6.81	4.30	262.0	25.0	ANN
150	15.31	15.51	-7.21	4.46	232.9	25.0	ANN
160	16.15	14.29	-7.38	4.49	227.2	75.0	ANN
170	16.51	12.64	-7.32	4.38	228.6	100.0	ANN
180	16.36	10.60	-7.05	4.14	237.6	100.0	ANN

NOx_worst_Case.out							
190	15.72	8.24	-6.56	3.77	241.2	100.0	ANN
200	15.53	7.74	-6.93	3.29	239.7	100.0	ANN
210	16.27	10.15	-8.66	2.71	218.4	125.0	ANN
220	16.52	12.26	-10.13	2.04	210.1	125.0	ANN
230	16.26	14.00	-11.30	1.32	200.3	125.0	ANN
240	15.51	15.31	-12.11	0.55	194.2	125.0	ANN
250	14.29	16.15	-12.57	-0.23	197.9	100.0	ANN
260	12.64	16.51	-12.63	-1.01	192.7	100.0	ANN
270	10.60	16.36	-12.32	-1.75	198.1	100.0	ANN
280	8.24	15.72	-11.63	-2.44	198.9	100.0	ANN
290	7.74	15.53	-11.05	-3.06	197.2	100.0	ANN
300	10.15	16.27	-10.84	-3.59	212.3	100.0	ANN
310	12.26	16.52	-10.30	-4.00	217.3	100.0	ANN
320	14.00	16.26	-9.45	-4.30	219.4	100.0	ANN
330	15.31	15.51	-8.31	-4.46	222.6	75.0	ANN
340	16.15	14.29	-6.92	-4.49	230.7	75.0	ANN
350	16.51	12.64	-5.31	-4.38	253.8	25.0	ANN
360	16.36	10.60	-3.55	-4.14	236.0	100.0	ANN

\* = worst case flow sector

\*\*\*\*\* MAKEMET METEOROLOGY PARAMETERS \*\*\*\*\*

MIN/MAX TEMPERATURE: 250.0 / 310.0 (K)  
 MINIMUM WIND SPEED: 0.5 m/s  
 ANEMOMETER HEIGHT: 10.000 meters  
 SURFACE CHARACTERISTICS INPUT: aersurface.out  
 DOMINANT SECTOR: 9 (240 270)  
 ALBEDO: 0.18  
 BOWEN RATIO: 0.78  
 ROUGHNESS LENGTH: 0.743 (meters)

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR MO DY JDY HR  
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 10 09 10 10 12

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O	LEN	Z0	BOWEN	ALBEDO	REF	WS
62.30	0.492	0.600	0.020	132.	794.	-182.2	0.743	0.78	0.18	3.00		

HT REF TA HT  
 -- -- -- -- --  
 10.0 310.0 2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 3.1 m/s  
 STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 11.0 meters  
 ESTIMATED FINAL PLUME RISE (non-downwash): 4.4 meters  
 ESTIMATED FINAL PLUME HEIGHT (non-downwash): 15.4 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR MO DY JDY HR  
 -- -- -- -- --  
 10 04 03 10 01



NOx\_Worst\_Case.out

H0      U\*      W\*    DT/DZ   ZICNV   ZIMCH   M-O   LEN      Z0    BOWEN   ALBEDO   REF   WS  
 -12.06   0.121   -9.000   0.020   -999.    97.      14.0   0.366    0.78    0.18      2.00

HT    REF   TA      HT  
 10.0   310.0    2.0

WIND SPEED AT STACK HEIGHT (non-downwash):      2.0 m/s  
 STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT:      11.0 meters  
 ESTIMATED FINAL PLUME RISE (non-downwash):      6.3 meters  
 ESTIMATED FINAL PLUME HEIGHT (non-downwash):    17.3 meters

\*\*\*\*\* AERSCREEN AUTOMATED DISTANCES \*\*\*\*\*  
 OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)
1.00	210.8	2500.00	12.28
25.00	423.9	2525.00	12.18
50.00	218.2	2550.00	12.08
75.00	244.9	2575.00	11.98
100.00	241.2	2600.00	11.88
125.00	227.9	2625.00	11.79
150.00	208.8	2650.00	11.69
175.00	192.1	2675.00	11.60
200.00	170.8	2700.00	11.50
225.00	149.8	2725.00	11.41
250.00	129.5	2750.00	11.32
275.00	110.2	2775.00	11.23
300.00	94.98	2800.00	11.14
325.00	85.20	2825.00	11.05
350.00	75.81	2850.00	10.97
375.00	66.86	2875.00	10.88
400.00	58.43	2900.00	10.80
425.00	50.67	2925.00	10.71
450.00	43.53	2950.00	10.63
475.00	37.22	2975.00	10.55
500.00	34.95	3000.00	10.46
525.00	32.99	3025.00	10.38
550.00	31.28	3050.00	10.30
575.00	29.77	3075.00	10.23
600.00	28.43	3100.00	10.18
625.00	27.35	3125.00	10.14
645.00	26.85	3150.00	10.09
650.00	26.73	3175.00	10.04
675.00	26.22	3200.00	9.998
700.00	25.79	3225.00	9.952
716.00	25.56	3250.00	9.906
725.00	25.44	3275.00	9.859
750.00	25.10	3300.00	9.813
775.00	24.77	3325.00	9.767
800.00	24.51	3350.00	9.722
825.00	24.24	3375.00	9.676
850.00	23.95	3400.00	9.630
875.00	23.66	3425.00	9.585
900.00	23.35	3450.00	9.539
925.00	23.04	3475.00	9.494
950.00	22.72	3500.00	9.449
975.00	22.40	3525.00	9.404

NOx\_worst\_Case.out

1000.00	22.08	3550.00	9.359
1025.00	21.75	3575.00	9.314
1050.00	21.43	3600.00	9.270
1075.00	21.11	3625.00	9.226
1100.00	20.91	3650.00	9.183
1125.00	20.71	3675.00	9.143
1150.00	20.50	3700.00	9.103
1175.00	20.29	3725.00	9.064
1200.00	20.07	3750.00	9.024
1225.00	19.85	3775.00	8.985
1250.00	19.64	3800.00	8.945
1275.00	19.42	3825.00	8.906
1300.00	19.19	3850.00	8.867
1325.00	18.97	3875.00	8.828
1350.00	18.75	3900.00	8.790
1375.00	18.54	3925.00	8.751
1400.00	18.34	3950.00	8.713
1425.00	18.14	3975.00	8.679
1450.00	17.94	4000.00	8.647
1475.00	17.75	4025.00	8.615
1500.00	17.57	4050.00	8.583
1525.00	17.40	4075.00	8.551
1550.00	17.23	4100.00	8.519
1575.00	17.06	4125.00	8.487
1600.00	16.90	4150.00	8.455
1625.00	16.75	4175.00	8.423
1650.00	16.59	4200.00	8.391
1675.00	16.43	4225.00	8.359
1700.00	16.27	4250.00	8.328
1725.00	16.12	4275.00	8.296
1750.00	15.96	4300.00	8.264
1775.00	15.81	4325.00	8.233
1800.00	15.65	4350.00	8.202
1825.00	15.50	4375.00	8.170
1850.00	15.35	4400.00	8.139
1875.00	15.20	4425.00	8.108
1900.00	15.05	4450.00	8.077
1925.00	14.90	4475.00	8.046
1950.00	14.76	4500.00	8.015
1975.00	14.62	4525.00	7.985
2000.00	14.50	4550.00	7.954
2025.00	14.37	4575.00	7.923
2050.00	14.25	4600.00	7.893
2075.00	14.13	4625.00	7.863
2100.00	14.01	4650.00	7.832
2125.00	13.89	4675.00	7.802
2150.00	13.77	4700.00	7.772
2175.00	13.66	4725.00	7.743
2200.00	13.55	4750.00	7.713
2225.00	13.44	4775.00	7.683
2250.00	13.33	4800.00	7.654
2275.00	13.22	4825.00	7.624
2300.00	13.11	4850.00	7.595
2325.00	13.00	4875.00	7.566
2350.00	12.90	4900.00	7.537
2375.00	12.79	4925.00	7.508
2400.00	12.69	4950.00	7.479
2425.00	12.58	4975.00	7.450
2450.00	12.48	5000.00	7.422
2475.00	12.38		

\*\*\*\*\* AERSCREEN MAXIMUM IMPACT SUMMARY \*\*\*\*\*

MAXIMUM            SCALED            SCALED            SCALED            SCALED

CALCULATION PROCEDURE	NOx_Worst_Case.out				
	1-HOUR CONC (ug/m3)	3-HOUR CONC (ug/m3)	8-HOUR CONC (ug/m3)	24-HOUR CONC (ug/m3)	ANNUAL CONC (ug/m3)
FLAT TERRAIN	434.5	434.5	391.0	260.7	43.45
DISTANCE FROM SOURCE	13.00 meters directed toward 80 degrees				
IMPACT AT THE AMBIENT BOUNDARY	210.8	210.8	189.7	126.5	21.08
DISTANCE FROM SOURCE	1.00 meters directed toward 190 degrees				

NOx\_Actual.out

AERSCREEN 15181 / AERMOD 15181

10/11/16  
14:53:23

TITLE: WINTERTON ROAD

\*\*\*\*\* STACK PARAMETERS \*\*\*\*\*

SOURCE EMISSION RATE: 0.1075 g/s 0.853 lb/hr  
 STACK HEIGHT: 10.98 meters 36.01 feet  
 STACK INNER DIAMETER: 0.350 meters 13.78 inches  
 PLUME EXIT TEMPERATURE: 393.0 K 247.7 Deg F  
 PLUME EXIT VELOCITY: 6.970 m/s 22.87 ft/s  
 STACK AIR FLOW RATE: 1421 ACFM  
 RURAL OR URBAN: RURAL  
 INITIAL PROBE DISTANCE = 5000. meters 16404. feet

\*\*\*\*\* BUILDING DOWNWASH PARAMETERS \*\*\*\*\*

USER DEFINED BPIPPRM INPUT FILE: 3572.BPI

MAXIMUM BUILDING HEIGHT: 9.2 meters 30.2 feet  
 MAXIMUM BUILDING LENGTH: 16.5 meters 54.2 feet  
 MINIMUM BUILDING WIDTH: 7.7 meters 25.4 feet

\*\*\*\*\* FLOW SECTOR ANALYSIS \*\*\*\*\*  
 25 meter receptor spacing: 1. meters - 5000. meters

FLOW SECTOR	BUILD WIDTH	BUILD LENGTH	XBADJ	YBADJ	MAX 1-HR CONC	DIST (m)	TEMPORAL PERIOD
10	15.72	8.24	-1.68	-3.77	75.93	25.0	ANN
20	15.53	7.74	-0.81	-3.29	70.45	125.0	ANN
30	16.27	10.15	-1.49	-2.71	74.96	125.0	ANN
40	16.52	12.26	-2.13	-2.04	80.21	100.0	ANN
50	16.26	14.00	-2.70	-1.32	107.8	25.0	ANN
60	15.51	15.31	-3.19	-0.55	133.7	25.0	ANN
70	14.29	16.15	-3.59	0.23	150.0	25.0	ANN
80*	12.64	16.51	-3.87	1.01	159.3	25.0	ANN
90	10.60	16.36	-4.04	1.75	119.9	25.0	ANN
100	8.24	15.72	-4.08	2.44	46.19	1.0	ANN
110	7.74	15.53	-4.48	3.06	43.50	1.0	ANN
120	10.15	16.27	-5.43	3.59	79.36	50.0	ANN
130	12.26	16.52	-6.22	4.00	94.82	25.0	ANN
140	14.00	16.26	-6.81	4.30	98.46	25.0	ANN
150	15.31	15.51	-7.21	4.46	87.56	25.0	ANN
160	16.15	14.29	-7.38	4.49	85.40	75.0	ANN
170	16.51	12.64	-7.32	4.38	85.94	100.0	ANN
180	16.36	10.60	-7.05	4.14	89.32	100.0	ANN

	NOx_Actual.out						
190	15.72	8.24	-6.56	3.77	90.66	100.0	ANN
200	15.53	7.74	-6.93	3.29	90.10	100.0	ANN
210	16.27	10.15	-8.66	2.71	82.07	125.0	ANN
220	16.52	12.26	-10.13	2.04	78.98	125.0	ANN
230	16.26	14.00	-11.30	1.32	75.27	125.0	ANN
240	15.51	15.31	-12.11	0.55	73.00	125.0	ANN
250	14.29	16.15	-12.57	-0.23	74.37	100.0	ANN
260	12.64	16.51	-12.63	-1.01	72.41	100.0	ANN
270	10.60	16.36	-12.32	-1.75	74.46	100.0	ANN
280	8.24	15.72	-11.63	-2.44	74.76	100.0	ANN
290	7.74	15.53	-11.05	-3.06	74.13	100.0	ANN
300	10.15	16.27	-10.84	-3.59	79.81	100.0	ANN
310	12.26	16.52	-10.30	-4.00	81.68	100.0	ANN
320	14.00	16.26	-9.45	-4.30	82.46	100.0	ANN
330	15.31	15.51	-8.31	-4.46	83.69	75.0	ANN
340	16.15	14.29	-6.92	-4.49	86.71	75.0	ANN
350	16.51	12.64	-5.31	-4.38	95.40	25.0	ANN
360	16.36	10.60	-3.55	-4.14	88.69	100.0	ANN

\* = worst case flow sector

\*\*\*\*\* MAKEMET METEOROLOGY PARAMETERS \*\*\*\*\*

MIN/MAX TEMPERATURE: 250.0 / 310.0 (K)  
 MINIMUM WIND SPEED: 0.5 m/s  
 ANEMOMETER HEIGHT: 10.000 meters  
 SURFACE CHARACTERISTICS INPUT: aersurface.out  
 DOMINANT SECTOR: 9 (240 270)  
 ALBEDO: 0.18  
 BOWEN RATIO: 0.78  
 ROUGHNESS LENGTH: 0.743 (meters)

METEOROLOGY CONDITIONS USED TO PREDICT OVERALL MAXIMUM IMPACT

YR MO DY JDY HR  
 -- -- -- -- --  
 10 09 10 10 12

H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O	LEN	Z0	BOWEN	ALBEDO	REF	WS
62.30	0.492	0.600	0.020	132.	794.	-182.2	0.743	0.78	0.18	3.00		

HT REF TA HT  
 -- -- -- -- --  
 10.0 310.0 2.0

WIND SPEED AT STACK HEIGHT (non-downwash): 3.1 m/s  
 STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT: 11.0 meters  
 ESTIMATED FINAL PLUME RISE (non-downwash): 4.4 meters  
 ESTIMATED FINAL PLUME HEIGHT (non-downwash): 15.4 meters

METEOROLOGY CONDITIONS USED TO PREDICT AMBIENT BOUNDARY IMPACT

YR MO DY JDY HR  
 -- -- -- -- --  
 10 04 03 10 01

NOx\_Actual.out

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H0      U*      W*      DT/DZ  ZICNV  ZIMCH  M-O  LEN      Z0      BOWEN  ALBEDO  REF  WS
-----
-12.06  0.121 -9.000  0.020 -999.  97.    14.0 0.366   0.78   0.18   2.00

HT      REF  TA      HT
-----
10.0    310.0  2.0
    
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WIND SPEED AT STACK HEIGHT (non-downwash):      2.0 m/s
STACK-TIP DOWNWASH ADJUSTED STACK HEIGHT:      11.0 meters
ESTIMATED FINAL PLUME RISE (non-downwash):      6.3 meters
ESTIMATED FINAL PLUME HEIGHT (non-downwash):    17.3 meters
    
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\*\*\*\*\* AERSCREEN AUTOMATED DISTANCES \*\*\*\*\*  
 OVERALL MAXIMUM CONCENTRATIONS BY DISTANCE

DIST (m)	MAXIMUM 1-HR CONC (ug/m3)	DIST (m)	MAXIMUM 1-HR CONC (ug/m3)
1.00	79.22	2500.00	4.614
25.00	159.3	2525.00	4.577
50.00	82.02	2550.00	4.540
75.00	92.05	2575.00	4.503
100.00	90.66	2600.00	4.466
125.00	85.65	2625.00	4.430
150.00	78.49	2650.00	4.395
175.00	72.20	2675.00	4.359
200.00	64.21	2700.00	4.324
225.00	56.31	2725.00	4.290
250.00	48.66	2750.00	4.256
275.00	41.43	2775.00	4.222
300.00	35.70	2800.00	4.188
325.00	32.03	2825.00	4.155
350.00	28.50	2850.00	4.122
375.00	25.13	2875.00	4.090
400.00	21.96	2900.00	4.058
425.00	19.05	2925.00	4.026
450.00	16.36	2950.00	3.995
475.00	13.99	2975.00	3.964
500.00	13.14	3000.00	3.933
525.00	12.40	3025.00	3.903
550.00	11.76	3050.00	3.873
575.00	11.19	3075.00	3.845
600.00	10.69	3100.00	3.828
625.00	10.28	3125.00	3.810
645.00	10.09	3150.00	3.793
650.00	10.05	3175.00	3.775
675.00	9.854	3200.00	3.758
700.00	9.692	3225.00	3.741
716.00	9.607	3250.00	3.723
725.00	9.561	3275.00	3.706
750.00	9.435	3300.00	3.689
775.00	9.310	3325.00	3.671
800.00	9.213	3350.00	3.654
825.00	9.110	3375.00	3.637
850.00	9.003	3400.00	3.620
875.00	8.892	3425.00	3.603
900.00	8.778	3450.00	3.586
925.00	8.660	3475.00	3.569
950.00	8.541	3500.00	3.552
975.00	8.420	3525.00	3.535

		NOx_Actual.out	
1000.00	8.299	3550.00	3.518
1025.00	8.177	3575.00	3.501
1050.00	8.055	3600.00	3.484
1075.00	7.934	3625.00	3.468
1100.00	7.859	3650.00	3.451
1125.00	7.783	3675.00	3.437
1150.00	7.705	3700.00	3.422
1175.00	7.625	3725.00	3.407
1200.00	7.545	3750.00	3.392
1225.00	7.463	3775.00	3.377
1250.00	7.380	3800.00	3.362
1275.00	7.298	3825.00	3.348
1300.00	7.215	3850.00	3.333
1325.00	7.132	3875.00	3.318
1350.00	7.049	3900.00	3.304
1375.00	6.970	3925.00	3.289
1400.00	6.894	3950.00	3.275
1425.00	6.818	3975.00	3.262
1450.00	6.743	4000.00	3.250
1475.00	6.670	4025.00	3.238
1500.00	6.605	4050.00	3.226
1525.00	6.539	4075.00	3.214
1550.00	6.477	4100.00	3.202
1575.00	6.414	4125.00	3.190
1600.00	6.354	4150.00	3.178
1625.00	6.294	4175.00	3.166
1650.00	6.235	4200.00	3.154
1675.00	6.175	4225.00	3.142
1700.00	6.116	4250.00	3.130
1725.00	6.057	4275.00	3.118
1750.00	5.999	4300.00	3.106
1775.00	5.941	4325.00	3.095
1800.00	5.883	4350.00	3.083
1825.00	5.826	4375.00	3.071
1850.00	5.769	4400.00	3.059
1875.00	5.713	4425.00	3.048
1900.00	5.657	4450.00	3.036
1925.00	5.602	4475.00	3.024
1950.00	5.547	4500.00	3.013
1975.00	5.496	4525.00	3.001
2000.00	5.449	4550.00	2.990
2025.00	5.403	4575.00	2.978
2050.00	5.357	4600.00	2.967
2075.00	5.311	4625.00	2.955
2100.00	5.266	4650.00	2.944
2125.00	5.221	4675.00	2.933
2150.00	5.176	4700.00	2.921
2175.00	5.134	4725.00	2.910
2200.00	5.092	4750.00	2.899
2225.00	5.051	4775.00	2.888
2250.00	5.009	4800.00	2.877
2275.00	4.968	4825.00	2.866
2300.00	4.927	4850.00	2.855
2325.00	4.887	4875.00	2.844
2350.00	4.847	4900.00	2.833
2375.00	4.807	4925.00	2.822
2400.00	4.768	4950.00	2.811
2425.00	4.729	4975.00	2.800
2450.00	4.690	5000.00	2.790
2475.00	4.652		

\*\*\*\*\* AERSCREEN MAXIMUM IMPACT SUMMARY \*\*\*\*\*

MAXIMUM            SCALED            SCALED            SCALED            SCALED

CALCULATION PROCEDURE	NOx_Actual.out				
	1-HOUR CONC (ug/m3)	3-HOUR CONC (ug/m3)	8-HOUR CONC (ug/m3)	24-HOUR CONC (ug/m3)	ANNUAL CONC (ug/m3)
FLAT TERRAIN	163.3	163.3	147.0	97.98	16.33
DISTANCE FROM SOURCE	13.00 meters directed toward 80 degrees				
IMPACT AT THE AMBIENT BOUNDARY	79.22	79.22	71.30	47.53	7.922
DISTANCE FROM SOURCE	1.00 meters directed toward 190 degrees				