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Environmental Preview Report

Addendum 2

Industrial Composting Facility

Argentia Access Road, NL

To:

NL Department of Municipal Affairs and Environment
Environmental Assessment Division
P.O. Box 8700, St. John's, NL A1B 4 J6

Proponent:

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Attention: Mr. Ted Penney

31 January 2018

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1. Executive Summary

After review of Addendum 1 document to the Environmental Preview Report, the Minister of Municipal Affairs and Environment requested that an air dispersion modelling and analysis (ADM&A) be done to confirm that the proposed indoor composting facility would not emit any malodor to the immediate surrounding environment.

An extensive ADM&A was done by the Proponent and its Consultant, as directed by the Air Pollution Prevention Division of the Department of Municipal Affairs and Environment. Personnel at the Air Pollution Prevention Division closely oversaw the entire execution of the ADM&A to confirm that it was done right and that the results would be accurate and reliable.

The results of the ADM&A are simple and clear. There will be no odor detected beyond the perimeter of the indoor composting facility site, even if the odor abatement equipment and systems are not functioning.

The Minister's directives also required that a public information session be held in the area where the indoor composting facility will be located. The Proponent held that public meeting in Whitbourne, at the school, on Friday January 12th, 2018.

The Consultant presented the scope, methodology and results of the ADM&A to the attending public. Then, the session was opened to the attending public for questions and comments.

Questions and comments were mostly about the risk and the mitigation of malodor emissions from the facility and its operation. Most actual questions were addressed directly at the meeting, in this Addendum 2 report and in the previous submittals by the Proponent to the Environmental Assessment Division of the Department of Municipal Affairs and Environment.

2. Introduction

This Environmental Preview Report - Addendum 2 document is structured to address both of the items of information in the same order as outlined in the letter issued by the minister on 18 August 2017 following the government and public review of the Environmental Preview Report and the Addendum 1 document.

The main requirement for this document is to report on the execution of the air dispersion analysis and the results from the air dispersion modelling that was done over the last few months.

The other requirement from the Minister of Municipal Affairs and Environment was to conduct a public information session to address questions and issues from the public arising from this report and presentation of the air dispersion analysis.

It should be clearly understood by everyone interested in this document that the primary and overriding goal of carrying out air dispersion modelling and analysis for the proposed industrial composting facility is to carefully assess the risk of malodors at and nearby the site of the proposed facility.

All other questions, considerations and issues raised by the public and the Department of Municipal Affairs and Environment (DoMAE) about the facility as planned have been addressed in the previous Environmental Assessment documents, Environmental Preview Report, and their addendums as well as in the first public information session held last November 2016 in Whitbourne.

The only remaining salient issue that was indicated by the public and the DoMAE to require more planning and analysis was the risk of malodor and associated nuisance from the proposed indoor industrial composting facility at the proposed site, as outlined in the Minister's letter to the Proponent.

Therefore, the Proponent undertook to do a proper air dispersion modelling and analysis (ADM&A) to demonstrate without a doubt that the facility will not emit bad odors in the immediate spacial environment of the facility, let alone any odors in the surrounding roads and residential and commercial areas that are typically 3 km or more from the proposed site.

The Proponent undertook and completed the ADM&A as per the strict guidance and requirements of DoMAE, Pollution Prevention Division, that defines the methods and the tools by which such ADM&A should be done, and for that purpose, DoMAE prescribes very advanced and up-to-date methods and technologies. In other words, the strict methods and tools that were used for this case, are typically used and enforced throughout the industrialized world and are recognized as state-of-the-art providing the most accurate results.

DoMAE, Pollution Prevention Division, follows up, diligently verifies and validates every step of the ADM&A from beginning to end. DoMAE strictly specified to the Proponent and to the Consultant:

1. The software tools to be used, that is the CALMET-CALPUFF-CALPOST software package developed for the California Air Resources Board (CARB), and is the preferred modelling software for the US Environmental Protection Agency (EPA) as well as being the required tool as prescribed by the Government of Newfoundland & Labrador;
2. The extent of time, land and air space beyond the site to cover in the analysis;
3. In this case 3 years of historical meteorological data (2014, 2015, 2016) was modelled with data points every 3 hours;
4. 50 km by 50 km square area was covered, the center of which was the proposed site. That area therefore extended to Bay Roberts to the North East, the middle of Trinity Bay to the North West, Colinet to the South, Argentia to the South West and St. Mary's Bay to the South East;
5. The extent of altitude was several thousand meters above sea level;
6. The Consultant was required to buy specific meteorological data files from recognized and approved scientific data suppliers;
7. The Consultant had to also procure approved land use and terrain data files for the vast area prescribed;
8. In this specific application of the ADM&A, DoMAE-Pollution Prevention Division directly supervised the Consultant and verified the correctness of every input variables and parameters to be used and included in the (large) input files to be processed by the software in three sequential steps;
9. At every input stage (3 stages) and at every output stage (3 stages), DoMAE-Pollution Prevention Division audited the input and output data to satisfy itself that the modelling was done correctly and the results would be accurate, realistic and meaningful;
10. The Consultant was strictly directed to use specific receptors and receptor grid, which covered the area with a very high receptor density;
11. The Consultant was required to comply with a specific content (text, data, graphics) and format to report methods and results in this document;

At a high level of detail, DoMAE-Pollution Prevention Division uses and enforces its guidance document for the purpose of ADM&A - Guideline for Plume Dispersion Modelling[1].

Such approach taken by DoMAE-Pollution Prevention Division to follow up and enforce proper air dispersion modelling execution is a standard approach taken by every other regulators in Canada and elsewhere. Because the modelling and data processing task is so large that the only way to verify execution and results is to verify and validate at every stage of inputs and outputs along the way.

[1] Lawrence, B. (2012). *Guideline for Plume Dispersion Modelling.* St. John's: Department of Environment & Conservation.

3. Background to Air Dispersion Modelling and Analysis

Air dispersion modelling is a scientific approach for describing how various different chemicals get diluted into the surrounding environment. In this model, the only compound being tracked is the odor emissions from the facility. Several factors play a role in how these chemicals get diluted into the environment. Extreme elevation changes, such as large hills, cliffs, or mountains affect the local environment in an area and can has an effect on the dilution process. Land cover/use plays a role as the environment may include various types of forestry and vegetation, different man-made structure, such as building, farmlands, and roads, and seasonal factors such as snow can have varying effects on the dilution of the chemicals. Finally, meteorological factors have the most significant effect on the dilution process since winds, precipitations, temperature, etc. along with the variations of all these factors between seasons and even years will heavily dictate the path and direction by which the chemical compounds are dispersed around a given area.

The air dispersion modelling was performed using the CALPUFF software package, which includes three main components, CALMET, CALPUFF, and CALPOST. This modelling software was chosen since in it the provincially-approved software for performing this type of environmental assessment. All modelling parameters used were taken directly from the Guideline for Plume Dispersion Modelling, as issued by the DoMAE, last updated as of 18 September 2012. All images displaying geographic data are displayed in Universal Transverse Mercator (UTM), which is measured in kilometers (km), and is located in UTM Zone 22T. Any latitude-longitude coordinated mentioned are in the latest revision of the World Geodetic System from 1984 (WGS-84).

4. Modelling Odor Dispersion

The methodology and software prescribed in this situation is equally valid, accurate, and useful to analyze the dispersion of either concentrations of chemicals or odors emitted by a given point or area source. This methodology and tools are commonly used for both or either purposes.

A – Odors and Odor Concentrations in Composting Processes

Odors are not ordinary air contaminants. Odors are the results of perception, at least at the threshold levels and at the bearable perceptive levels of concentration or intensity. The perception, appreciation, and tolerance will vary among individuals, depending on time and environmental context. Because odors are mixtures of many complex organic volatile chemical compounds, chemical measurements cannot be used to quantify them directly. As such, odors have no particular toxicity levels, other than what can be indirectly induced by stress depending on the person and the situation (intensity, time of exposure, etc). Air quality standards cannot be relied on to control them in terms of air pollution contaminants and their measured or derived concentrations in the air being breathed. Odors are also difficult to measure directly in ambient air conditions. There are no portable easy way to measure ambient odors like noise using a sound level meter.

Odors are also subjective in their nature. An odor can be horrible (rotting carcass on a hot day) or delicious and inspiring (Channel No. 5 perfume or fabulous food simmering in the kitchen).

Similarly with sound, you can have noise or music, but whether it is odor or sound being thought about, a low level of sound or odor is imperceptible and as it increases in intensity it becomes more and more uncomfortable and even painful whether it is noise or music, or perfume or malodor. So there is the nature of the odor and its intensity that comes into play, and just like music that is very loud becomes only noise, even the best odors with excessive intensity become disgusting and offensive. (Have you ever lived in the close downwind vicinity of a McDonald or a Mary Browns?).

It is not being said that uncontrolled source separated organics composting will emanate good odors. Bad odors or good odors do not have necessarily a different threshold of initial perception. People perceive chemicals in terms of odors, not in terms of hydrogen sulfide (H_2S), ammonia (NH_3), or volatile organic chemicals (VOC). Chemical compounds are not additive in terms of odor perception. Similarly with sound, one can only hear the loudest frequencies. Lower intensity sound coming from other frequencies are not or hardly heard. Because sound comes from a range or domain of frequencies.

Odor is a difficult parameter to be measured, and because of such, there is no empirical way to measure the intensity of the odor. The accepted way of measuring odor concentrations is by having a panel judge a cubic meter volume containing a particular odor with a cubic meter volume that contains pure air[2]. When 50% of the panel is able to indicate that they smell an odor, that odor is considered to be at the detection or perception threshold. The detection threshold is when the odor has a concentration of 1 o.u./m^3, where an odor unit (o.u.) is a dimensionless dilution expressed as either dilution-to-threshold (D/T) or detection threshold[3]. This unit has been parameterized to be considered over a unit volume (1 m^3 or 1 cubic meter). What this value indicates is the amount of dilutions that are needed to reach the detection threshold, for example, 10,000 o.u./m^3 means that it takes 10,000 dilutions to reach the detection threshold for the sampled odor (Power, 2017).

Scientifically, odors are defined and quantified using Odor Unit, or abbreviated as "o.u.", and Odor Concentration or abbreviated as "c". By definition, 1 o.u./m^3 is when the odor is perceived by 50% of a panel of people - (1 o.u./m^3 corresponds to the detection threshold of the odor). Then, odor concentration (c) (number of odor units) is the number of dilutions (with odorless air) of the gas mixture required to obtain 1 o.u./m^3, back to the odor detection threshold. For example, with c = 10,000 o.u./m^3 means that it takes 10,000 dilutions to reach the detection threshold for this gas sample. This is how the analysis of odor emission can be connected, analyzed and predicted using air dispersion (dilution) modelling tools and scientific analytical methods.

[2] Department of Environmental Protection. (2002). *Odour Methodology Guideline.* Perth: Department of Environmental Protection.

[3] McGinley, C. M., & McGinley, M. A. (2006). An Odor Index Scale for Policy and Decision Making Using Ambient and Source Odor Concentrations. Lake Elmo: St. Croix Sensory Inc.

Examples and data[4] from scientific literature about odor concentrations are:

1 o.u./m^3 – Perception threshold
2-3 o.u./m^3 – Recognition threshold
5 o.u./m^3 – Discrimination threshold
10 o.u./m^3 – Risk of complaint

Perfumed person – 20 – 50 o.u./m^3
Fresh cut grass – 250 o.u./m^3
Old garbage – 500 o.u./m^3

From literature[5], typical odor levels for composting facilities are reported for the different processing area. Such odor levels can vary widely depending on the specific site, process and feedstock materials.

Reception Hall	Varies, can be >10,000 o.u./m^3
Active Composting	Varies, 1,000 to >10,000 o.u./m^3
Biofilter Exhaust	Varies, but typically 100 to 800 o.u./m^3

The odor removal efficiency of biofilters[6] is reported to be >98% for H_2S, >80% for NH_3 and >95% for odor units (D/T). This is consistent with the odor levels above.

The proponent intends to accept and process as fresh a raw material as possible to reduce odor emanations from the beginning. With the availability of a composting facility, producers of source separated organic wastes will have the option to dispose of their waste as soon as it is produced, and thereby reducing the odors and environmental impact of decaying organic waste.

From a characteristic analysis of odor gas emitted from food waste anaerobic fermentation[7], the level of odor concentration ranged from 2,523 odor units per cubic meter (o.u./m^3) to 3,577 o.u./m^3.

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[4] Raymond Porter, "Essentials of Odour Management for Organic Management Facilities", Compost Council of Canada, Odotech Inc. 2014

[5] http://www.odotech.com/en/composting-odor-control-tips-better-management/ This source also cites leachate pond. But the Proponent will not store leachate. Any leachate will be returned to the composting indoor winrows on a daily basis.

[6] Odor Control in Biosolids Management – Biosolids and Residuals Management Fact Sheet, EPA – September 2000, EPA 832-F-00-067

[7] Characteristic analysis for odor gas emitted from food waste anaerobic fermentation in the pretreatment workshop; Yanqiang Di, Jiemin Liu, Jianguo Liu, Siyuan Liu & Luchun Yan; Journal of the Air & Waste Management Association Vol. 63, Iss. 10, 2013; http://www.tandfonline.com/doi/full/10.1080/10962247.2013.807318?utm_source=TrendMD&utm_medium=cpc&utm_campaign=Journal_of_the_Air_%2526_Waste_Management_Association_TrendMD_0

Additional data[8] on odor concentrations emitted from composting sites before odor control/treatment processes are consistent:

Rotating drum/static pile for municipal solid waste system in Austria have odor concentrations ranging from 25,000 to 50,000 o.u./m^3.

In the Delaware Reclamation Project co-composting facility, where circular, agitated bed reactors compost sewage sludge and municipal solid waste, odor concentrations from undiluted exhaust gas stream are ranging from 3,500 to 25,000 o.u./m^3.

Other data sources on odor concentrations emitted from rendering, wastewater treatment, and composting facilities[9] indicate levels of odor in Figure 1 below.

Odor Index Values	Log Value	Odor Units or D/T	Example of Odor Source or Odor Situation
60.0	6.00	1,000,000	Rendering plant uncontrolled exhaust
50.0	5.00	100,000	Venting anaerobic digester gases
40.0	4.00	10,000	Sludge centrifuge vent
30.0	3.00	1,000	Primary clarifier weir cover exhaust
27.0	2.70	500	Dewatering building exhaust
24.8	2.48	300	Biofilter exhaust
20.0	2.00	100	Multistage scrubber exhaust
17.0	1.70	50	Carbon filter exhaust
14.8	1.48	30	Ambient odor adjacent to biosolids land application
11.8	1.18	15	Ambient odor adjacent to aeration basin
10.0	1.00	10	Design value sometimes used in odor modeling
8.5	0.85	7	Ambient odor level sometimes considered a nuisance
7.0	0.70	5	Design value sometimes used in odor modeling
6.0	0.60	4	Ambient odor level common is a city
3.0	0.30	2	Ambient odor level usually considered "just noticeable"
0	0.00	1	Ambient air in a community with "no odor" noticeable

Figure 1 - Odor dilution-to-threshold values of various exhaust sources

[8] Roger Tim Haug, "The Practical Handbook of Compost Engineering", CRC Press, 1993.
[9] McGinley, C. M., & McGinley, M. A. (2006). An Odor Index Scale for Policy and Decision Making Using Ambient and Source Odor Concentrations. Lake Elmo: St. Croix Sensory Inc.

B – Odor Concentration Level Selected for ADM&A

In order to be ultra-cautious in this analysis to ensure that there would be no detectable malodor outside the composting facility site perimeter, an odor concentration level was chosen that could be, realistically, the worst case scenario. Such a worst case scenario would be that very odorous raw materials are composted without having the odor treatment/abatement systems and processes operational. These odor abatement systems and processes include the biofilters, adequate building ventilation, adequate Carbon-Nitrogen ratio, adequate aeration of the composting piles, composting piles operating in aerobic fermentation, etc.

With the proposed facility design, the two buildings that will house the composting process are ventilated with 15,000 up to 50,000 cubic feet per minute each. Fresh air is sucked in the building sweeping over the compost in process, and exhausted out through the biofilters. Therefore the maximum air flow being emitted from the facility and projected outdoors at ground level is 100,000 cubic feet per minute or 47 cubic meter per second. In light of the odor concentrations of feedstock and composting processes documented in the literature and reported in this section, it was chosen to start the ADM&A for the facility with an input odor concentration of 23,500 o.u./m^3. As the typical design odor concentration at the outlet of the biofilter is 500 o.u/m^3, this 23,500 o.u./m^3 represents a worst case scenario that would be 47 times higher and worst odor concentration than what the most active normal operation of the facility with the biofilter being properly operational. Extrapolating this information, it is estimated that an odor concentration of approximately 100,000 o.u./m^3 would be needed for any odor to be detected in the closest of the nearby communities.

With biofilter efficiencies reported in the literature between 88% and 98%, a properly designed and operating biofilter can abate odor concentrations of 4,200 to 25,000 o.u./m^3. Therefore, the 23,500 o.u./m^3 odor concentration level selected for the ADM&A is equivalent to operating the composting facility at full capacity without a biofilter to abate the odors.

In this biofilter design, the size of the biofilter has been increased by 35% and 50% for each building as an additional precaution, and to ensure, as much as possible, that the biofilter efficiency would be maximized for the design air flow rate sweeping through the buildings and the biofilters. The design and sizing of the air flow rates through the building have also been very conservatively calculated, relative to the sizes of the building to dilute odors emanated within by the composting operations in the buildings, such that the odor concentration in the air stream will be substantially diluted before going through the biofilters. This is to further reduce the risk of high odor concentrations to be emitted by the facility.

Within the indoor composting facility, odor abatement is done first through dilution of original odor concentration from the compost pile by the fresh air ventilation sucked in the building, and then by the exhaust air been passed through the biofilters. The high fresh air inlet flow rate will substantially dilute the odor concentration emanating from the composting piles in the building, and the same air flow entering the biofilters will have a substantially reduced odor concentration.

5. CALMET

CALMET is a meteorological modelling software that is a part of the CALPUFF modelling system which is used to develop hourly wind and temperature fields on a three-dimensional gridded modelling domain, as well as handling for associated two-dimensional fields such as mixing heights, surface characteristics, and dispersion properties[10]. For the odor dispersion modelling for the Argentia Access Road Industrial Composting Facility, CALMET v. 6.5.0 L150223 was used as it is the newest available update for this modelling system.

A – CALMET Input Files

In order to be able to use CALMET to create a meteorological model, several input files need to be acquired first. The input meteorological data consisted of three years' worth of Weather Research and Forecasting mesoscale model (WRF), in the 3D.DAT data file format, which include such information as hourly wind and temperature fields, precipitation data, etc. This data has a domain size of 50 x 50 km, a resolution of 12 km, and is centered about the composting facilities proposed location. This WRF data for this area was obtained through Lakes Environmental, and can be seen in the Figure 2 below. Beyond this, there is a required geophysical data file (GEO.DAT) that contains the terrain and land use data for the area stated prior.

[10] Scire, J. S., Robe, F. R., Fernau, M. E., & Yamartino, R. J. (2000). *A User's Guide for the CALMET Meteorological Model.* Concord: Earth Tech Inc.

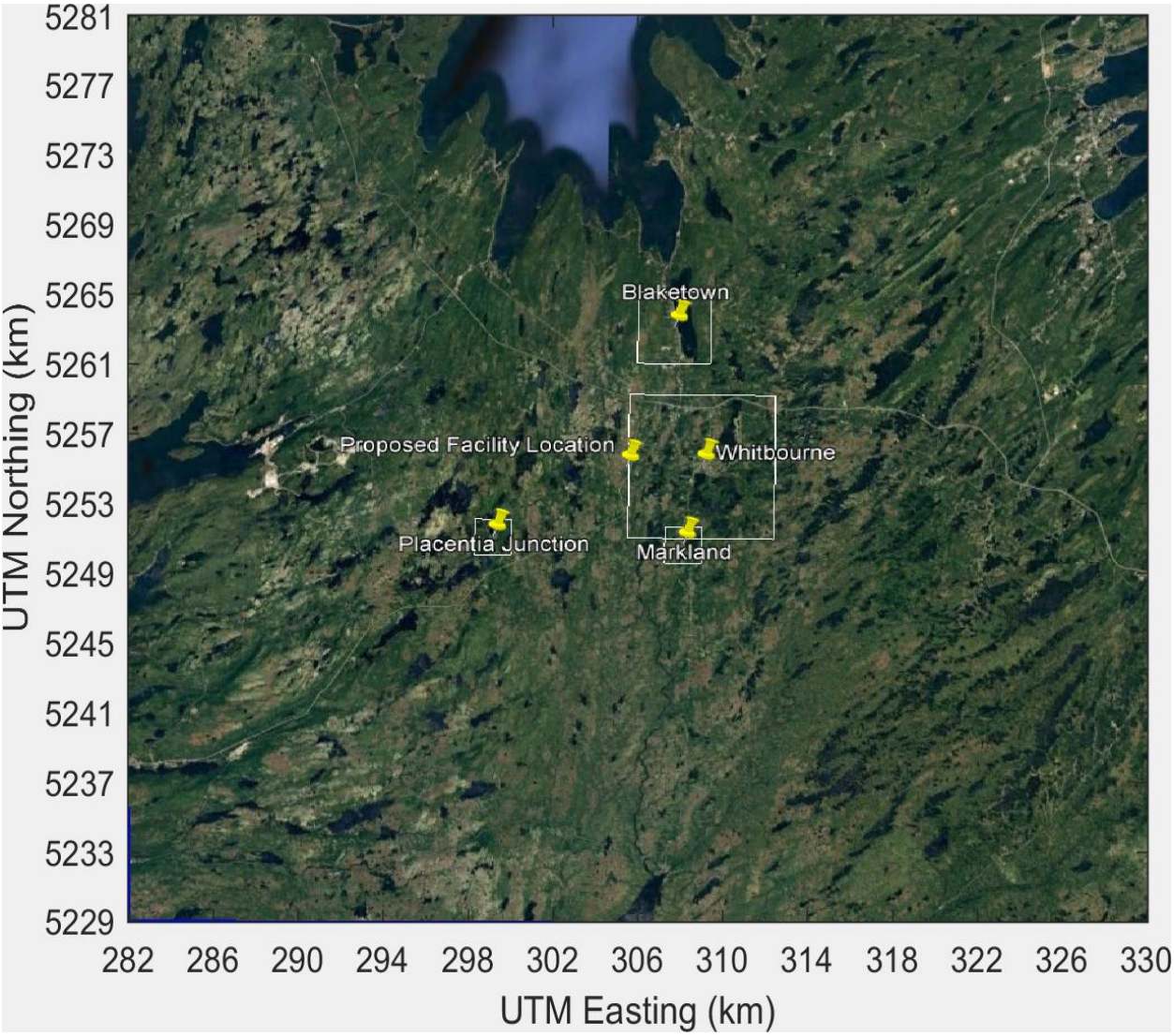

Figure 2: Full area of WRF data with markers for proposed site and nearby residential areas

B – CALMET Preprocessing Utilities

The geophysical data file (GEO.DAT) is created through the use of several preprocessing tools; the following versions of these tools were used for this model: CTGPROC v. 7.0.0 L150211, TERREL v. 7.0.0 L141010, and MAKEGEO v. 3.2 L110401. CTGPROC processes and grids inputted land use data, which was acquire from the DoMAE. TERREL combines and grids terrain information from inputted digital elevation model (DEM), which was acquired from the Government of Canada's Open Data portal. Once these two files are properly constructed, they can be inputted into the final preprocessing tool MAKEGEO, which merges the land use and terrain

data together to create the needed GEO.DAT for input into CALMET[11]. In total, 12 separate GEO.DAT files were created to accommodate for differences in land use and terrain across the four seasons (Winter, Spring, Summer, Autumn) for each of the three years (2014, 2015, 2016).

C – CALMET Modelling

In order to properly model the meteorological data, certain parameters are required to be followed to ensure accuracy of the outputted data. 12 separate CALMET models were ran to account for each of the four seasons across the three years. The seasons are defined as follows for the Avalon Peninsula, Burin Peninsula, and South Coast[12]:

1. Non-Winter: May 16 to October 31
2. Winter (without snow cover): April 1 to May 15 & November 1 to December 31
3. Winter (with snow cover) January 1 to March 31

While winter without snow cover covers two separate periods of time, separate GEO.DAT files were created regardless. Each one of these models was generated on a meteorological Cartesian grid with domain size of 20 km x 20 km with a grid spacing of 0.25 km and nine vertical cell faces. The map with superimposed grid can be seen below in Figure 3.

D – CALMET Output Files

For each of the 12 models that were generated, 12 CALMET data model files (CALMET.DAT) were created for processing within the next step in the software package, CALPUFF. These 12 meteorological models will all be inputted into a single CALPUFF model consecutively to generate the air dispersion model for the desired chemical agent, in this case odor.

[11] Exponent Engineering and Scientific Consulting. (2015). *Exponent Engineering and Scientific Consulting*. Retrieved from Codes & Related Processors: Version 7: http://www.src.com/

[12] Lawrence, B. (2012). *Guideline for Plume Dispersion Modelling.* St. John's: Department of Environment & Conservation.

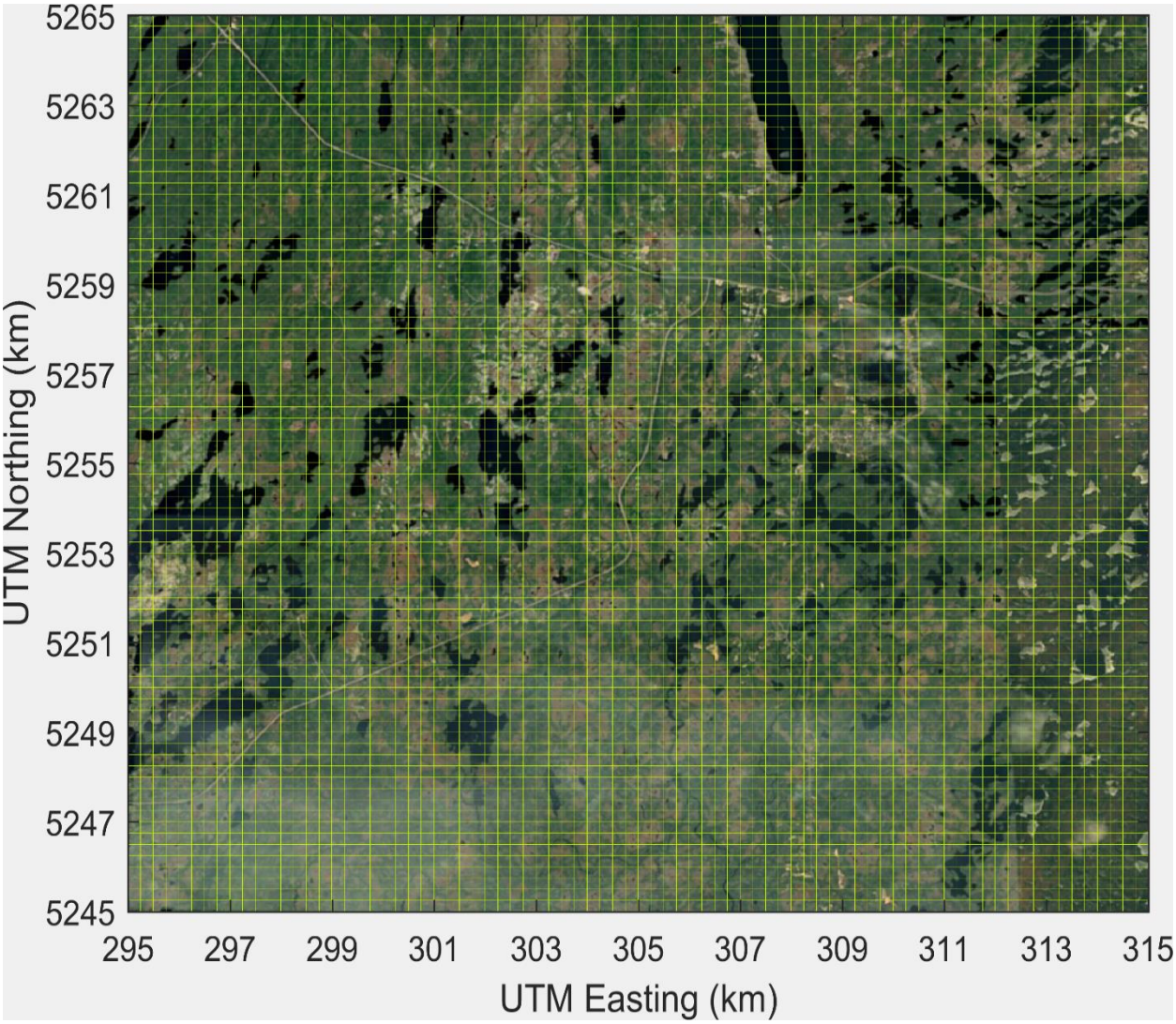

Figure 3: Cartesian grid superimposed on area modelled (Axes are UTM coordinates measured in km)

6. CALPUFF

CALPUFF is a Gaussian puff dispersion model with chemical removal, wet and dry deposition, complex terrain algorithms, building downwash, plume fumigation, and other effects[13]. For the odor dispersion modelling for the Argentia Access Road Industrial Composting Facility, CALPUFF v. 7.2.1 L150618 was used as it is the newest available update for this modelling system.

[13] Scire, J. S., Robe, F. R., Fernau, M. E., & Yamartino, R. J. (2000). *A User's Guide for the CALMET Meteorological Model.* Concord: Earth Tech Inc.

A – CALPUFF Input Files

The only necessary input files for the CALPUFF model are each of the outputted CALMET.DAT files which contain the meteorological models for each of the respective seasons for the three years modelled. These models will be ran consecutively through the air dispersion modelling to generate a single CALPUFF model.

B – CALPUFF Modelling

CALPUFF was modelled using an equivalent grid size and grid spacing to that of CALMET. In addition to the Cartesian grid that is used, discrete receptor are generated to the following specifications[14]:

1. 50 meter spacing from the center of the operation out to 500 meters;
2. 100 meter spacing from 500 meters out to 1000 meters;
3. 200 meter spacing from 1000 meters out to 2000 meters;
4. 500 meter spacing beyond 2000 meters;
5. 50 meter spacing within all residential areas located less than 1000 meters of the administrative boundary;
6. 100 meter spacing within all residential areas located beyond 1000 meters of the administrative boundary, but located within 2000 meters of the administrative boundary;
7. 200 meter spacing within all residential areas located beyond 2000 meters of the administrative boundary.

As seen in Figure 4, the receptors are shown across the desired area, with one exception in that 200 meter spacing was maintained for all distances beyond 2000 meters to accommodate for the reduced spacing of receptors in residential areas nearby. These receptors are critical since they will track the dispersion of the odor as the puffs travel away from the facility.

[14] Lawrence, B. (2012). *Guideline for Plume Dispersion Modelling.* St. John's: Department of Environment & Conservation.

The emissions sources for this facility are two area sources with dimensions of 10 m x 34 m and 10 m x 40 m, respectively, and both are located behind two nearby structures. The only chemical being tracked is the odor emitted from these two emission sources.

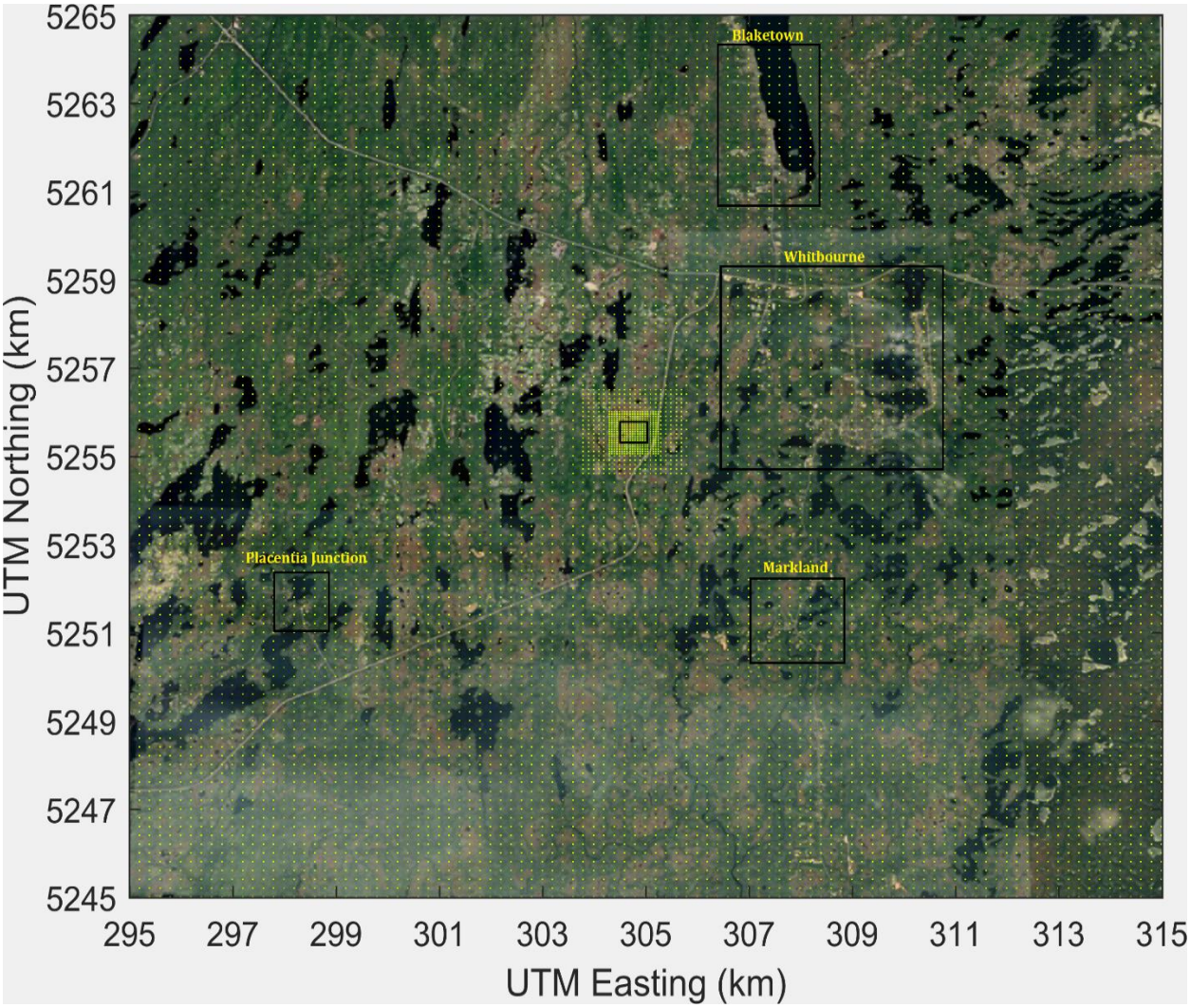

Figure 4: Map of modelled area with superimposed receptors and residential areas

C – CALPUFF Outputs

The main output from CALPUFF with regards to odor is the concentration data file (CONC.DAT). This file will be used in the final part of the CALPUFF modelling software package, CALPOST, to compile the data into such a way that it is more easily interpretable.

7. CALPOST

CALPOST is a post-processing tool used to compile data from the CALPUFF model into an easily readable format. In particular, the Top-4 24-hour concentrations are calculated for each receptors across the entire three years' worth of meteorological data, this data is included in Table 1 in 13. 11. Appendix 1 – Odor Concentrations at Affected Receptors, but has excluded all receptors beyond a 2 km x 2 km area since after that all the recorded values at each of these receptor were zero.

8. Discussion

The CALPUFF software package was originally developed by Sigma Research Corporation (SRC) for the California Air Dispersion Board (CARB). Subsequently, SRC became a part of Earth Tech, Inc. under which the US EPA chose CALPUFF as a preferred model in their *Guideline on Air Quality Models*. Since then, the software ownership was switched from Earth Tech, and currently, the owner is E^{x}ponent, who is responsible for maintaining and distributing the software. The decision from the US EPA to make CALPUFF the preferred model comes from the fact, "It was concluded from these case studies that the CALPUFF dispersion model had performed in a reasonable manner, and had no apparent bias toward over or under prediction, so long as the transport distance was limited to less than 300 km"[15]. CALPUFF is proven to show no apparent bias within a substantial area, one that is much greater than the area being modelled for this study; therefore, the results gathered from the generated model are known to be accurate and unbiased.

The main tool used by CALPUFF to measure concentrations of pollutants are receptors. The receptors that have been generated for use within CALPUFF are there to record the odor concentrations that are detected. By recording the odor concentrations, it will determine how much, if any, odor will be detectable. After placing all the receptors based on the above set of parameters, all receptors within nearby communities were all outside of the 2 km x 2 km area surrounding the facility, but in order to simplify the production of these receptors, all areas beyond 2 km maintained the 200 m spacing that was required. This allows not only for more accurate readings, but provides more sensitive data points to detect if any odor could come in proximity of these communities. As indicated in section 3 above, the threshold odor concentration that will need to be exceeded is 10 o.u./m^3; therefore, if the odor concentrations remain lower than this there should be little risk of complaint.

The model was set up in such a way as to include a wide variety of areas that had been referenced as being potentially affected by the emissions from this facility. To be conservative, the assumption was made to run the simulation with the worst-case scenario happening, in this case, considering that the biofilters for the emission sources are not working at all. By making this

[15] Office of the Federal Register. (2003). *Code of Federal Regulations - Appedix W: Guidline on Air Quality Models.* Washington, D.C.: Office of the Federal Register.

assumption, the odor emitted from the facility should be several factors greater than if the biofilters are working as expected.

9. Results

Biofilter exhaust, which will be the same type of emission coming from the proposed facility, has a known dilution-to-threshold of 300 o.u/m^3, as seen in Figure 1 (McGinley & McGinley, 2006). Assuming that for the worst-case scenario, the biofilters are not functioning properly, a greater value for the dilution-to-threshold must be chosen, and in this case 23,500 o.u./m^3 is chosen. This value is substantially higher than that of typical biofilter exhaust and will show what potential odor concentrations are possible in nearby communities if the worst-case scenario were to become reality. This scenario is analyzed to also represent a temporary peak in odor concentration at the facility due to a number of possible situations, such a delivery truck breaking down outside, a particularly odorous feedstock, a composting recipe, process needing adjustment, etc.

Both emission sources combined (biofilters) will have an output ventilation air flow rate of up to 47 m^3/sec. This means that the flow of odor from the two emission sources is substantially greater than that of typical biofilter exhausts. This ADM&A exercise assumes the flow of the odor through the non-functioning biofilter, and shows a 47 fold odor concentration increase in the amount of odor that is getting emitted by each of the emission sources. This will cause a substantial increase in the odor concentrations recorded at receptors, especially those within the facilities boundaries. The site plan for the facility is attached in Appendix 2 – Site Plan for reference.

With the inputs as discussed, the results of the modelling show that the odor only breaks the threshold for complaint, 10+ o.u./m^3, in the immediate vicinity of the facility. Beyond the facility the odor dissipates very quickly, and is not perceivable after less than a kilometer in each direction away from the facility. The model shows that the odor will never reach a level above 0 o.u./m^3 in any nearby residential areas, such as, Blaketown, Whitbourne, Markland, or Placentia Junction. These results are illustrated in Figure 5 (full area) and Figure 6 (area with any odor detected) below. The Top-4 24-Hour concentration table also confirms that the odor is only substantial in close proximity to the facility, this table can be viewed in Appendix 1 – Odor Concentrations at Affected Receptors. These results are for the worst-case scenario for the odor dispersion, and as such verify that with the biofilters being operational, even if only somewhat, the odor will have no substantial affect beyond the facilities immediate surrounding area.

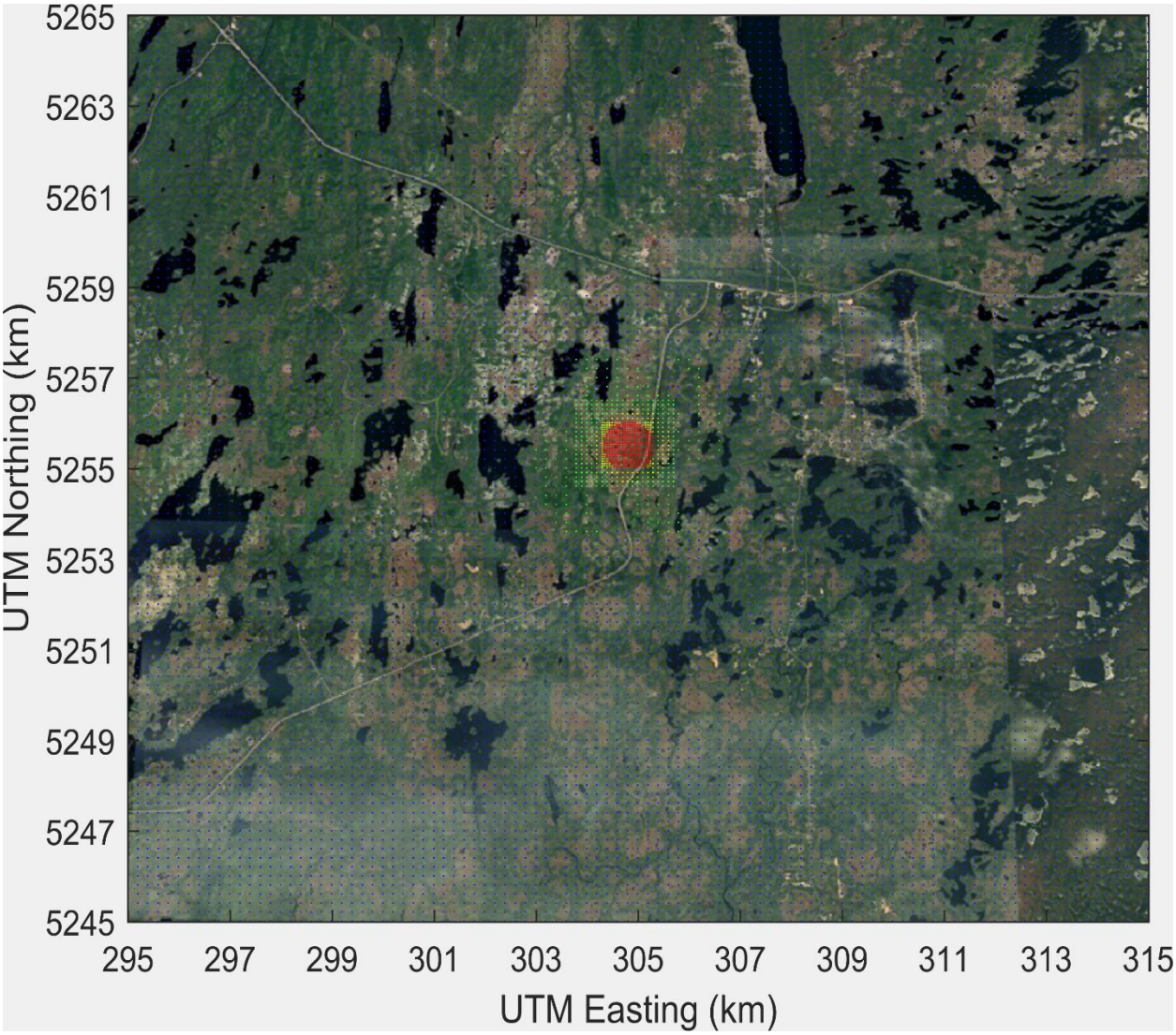

Figure 5: Map of full are modelled with highest concentration of odors at each receptor color-coded as follows: Blue – 0 o.u./m^3, Green – between 0-1 o.u./m^3, Yellow – between 1-5 o.u./m^3, Orange – between 5-10 o.u./m^3, Red – 10+ o.u./m^3

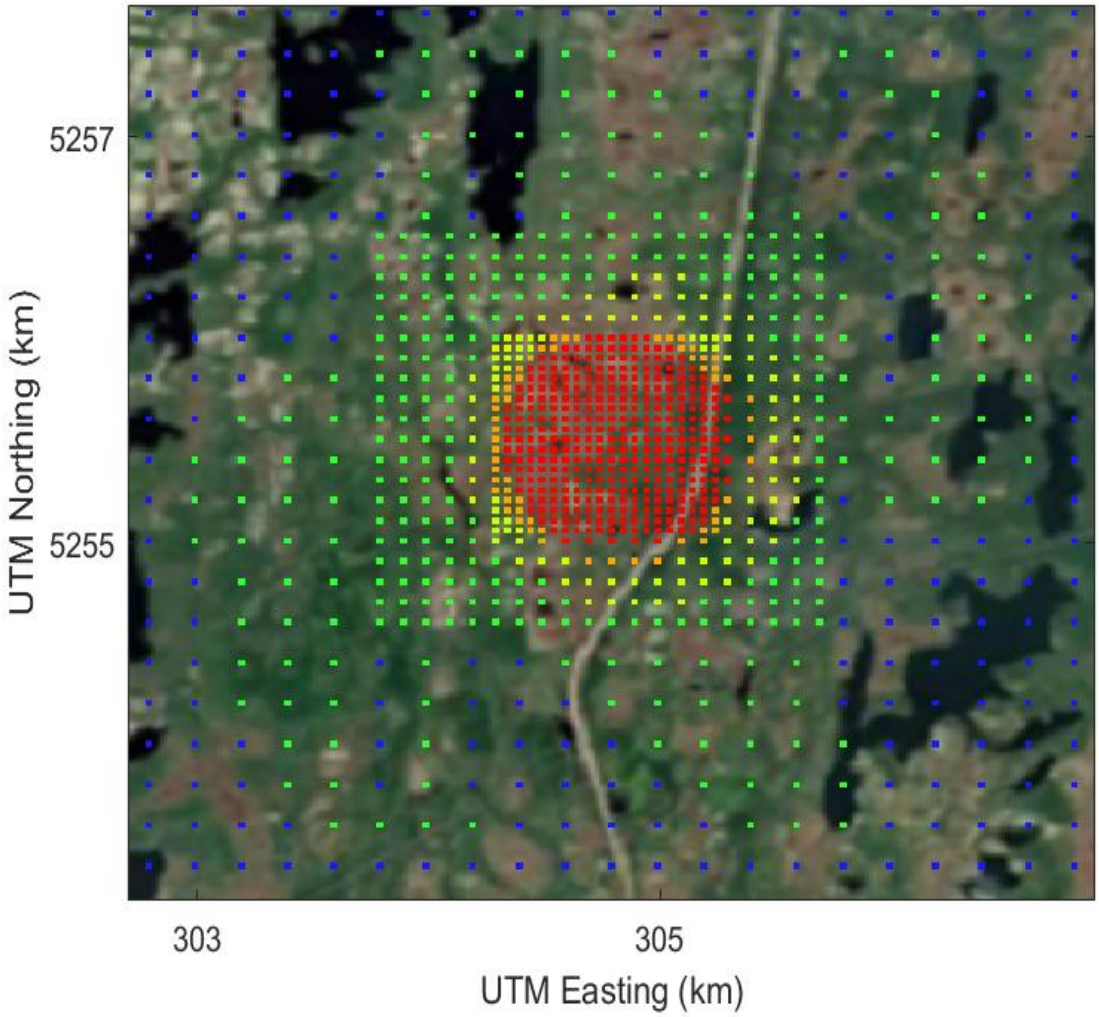

Figure 6: Zoomed in view of maximum odor concentrations at all affected receptors, color-coded the same as Figure 4

10. Public Information Session and Feedback

An Open House Public Information Session was held on Friday January 12th, 2018 at 7 PM at Whitbourne Elementary School in Whitbourne near the site of the proposed indoor industrial composting facility. As required by the letter from the minister of DoMAE, the Proponent and his engineering consultant delivered a presentation to provide information about the odor dispersion modeling and analysis to the public. The presentation was followed by a period of statements of positions by individual members of the attending public and of reasonable genuine questions from others. A copy of the presentation is included in Appendix 4 – Public Presentation.

The public meeting was well attended with 70 people from the local area. The mayor of Whitbourne, Ms. Hilda Whelan, as well as Honorable Ms. Sherry Gambin-Walsh, Minister of the Service NL and local MHA for Placentia - St. Mary's district, were in attendance. The public information session went on for three and a half hours.

We would like to recognize and thank again Ms. Patti Kennedy, administrator of Whitbourne Elementary, for her kind assistance in booking the event, and providing an excellent set up for the venue.

As per Section 10(2) of the Environmental Assessment Regulations, 2003, the Proponent has notified the Minister and the public of the scheduled meeting not fewer than 7 days before that meeting. The meeting was advertised in The Telegram from Wednesday January 3rd to Thursday January 11th, 2018. The Consultant also notified the Whitbourne Town Office of the public information session by phone several days in advance.

Questions from the Attending Public

Odor Control within the Proposed Facility

Several questions were asked about odor control plans for different stages of the composting process in the proposed composting facility. From the delivery and logistics of raw materials and feedstock, to entering the facility buildings, to transfer of products in process between buildings, and loading and transport of finished products out of the facility.

Odor control plans as well as various explanations and information on the proposed composting processes have answered most of these questions in the Environmental Assessment documents and Environmental Preview Report and their respective addenda submitted previously, and available online at the DoMAE[16] .

With this being said, however, the execution of the ADM&A as requested by the Minister of MAE, confirms that whatever high odor concentration source of odor possibly emanating from the site will not be perceived beyond the perimeter of the facility. As indicated earlier in this current document, the ADM&A was done with such a very high initial odor concentration, that it predicts very conservatively no odor perception beyond the perimeter of the facility.

The Proponent and the Consultant wish to reiterate that odor control and management is an essential and fundamental element of the composting process. In other words, well before applying and using odor abatement technologies and equipment such as biofilters, building enclosures, and others, the proper composting recipe and process ensures that the odor emission will be minimized. This is about proper carbon-nitrogen ratio. This is about maintaining the proper moisture level in the composting pile. This is about adequate turning and aeration (to prevent the composting to become anaerobic and stinky). This is about temperature measurement and

[16] http://www.mae.gov.nl.ca/env_assessment/projects/Y2016/1838/index.html

control in the composting piles to see that optimal composting takes place. This is about direct control of selection of organic raw material (refusing specific raw materials that the facility cannot successfully process). This is about acquiring organic raw material as fresh as possible from the supplier (scheduling deliveries optimally for both the supplier and the receiving composting facility). This is about the due diligence that DoMAE will provide for the benefit of surrounding communities to inspect and enforce proper composting results that do not become a nuisance or a danger to the public if not done well and according to codes, standards and regulations.

Furthermore, the Proponent has committed to starting with a very low level of composting production and increasing it as slowly or rapidly as it demonstrates to DoMAE its ability to successfully compost an increasing amount of organic raw material. The Proponent also reserves the right to pick and choose the organic raw material it accepts to compost it most easily and successfully, and correspondingly with the best financial returns. Therefore, the Proponent is not going to accept raw material that creates problems in terms of difficulty in composting and more difficulties in terms of odor control, profitability, etc. All that because, there is way more organic raw material available in the Avalon region of the province than the proposed facility's capacity to compost.

Why Whitbourne Proximity for the Location of the Proposed Facility?

Several questions and comments were expressed about the rationale for selection of the location for the proposed composting facility. This was clearly and extensively addressed in the Environmental Assessment documents and Environmental Preview Report and their respective addenda submitted previously, and available online at the DoMAE[17].

But nonetheless, the site selected has all the positive attributes for a composting facility, because:

1. It is along a main highway thoroughfare;
2. It is reasonably centralized and located at reasonable (economical) distances from sources of raw materials and markets for finished products;
3. It is at sufficiently great distances from neighboring towns, cottage areas, highway stops and rest areas, or public parks or nature conservation areas;
4. It is located on a sufficiently large track of land to provide the necessary isolation (visual and otherwise) from the highways and public access roads;
5. The agricultural land available for the installation of the facility has no existing use, and provides the right attributes for such occupancy, in terms of topography, hydrographic setting, soil and geotechnical properties;
6. The installation of the composting facility on the land does not damage or displace or disrupt in any way, any ecologically sensitive areas, watershed conservation areas, nature conservation areas, or marshlands;
7. When considering all the constraints and required attributes for a site for a composting facility, there are actually very few suitable sites on the Avalon Region and the Burin-Bonavista peninsulas areas of the province;

[17] http://www.mae.gov.nl.ca/env_assessment/projects/Y2016/1838/index.html

8. Finally, the Proponent has done extensive search for an adequate site location, in collaboration with Department of Fisheries and Land Resources (Agriculture), Crown Lands, and other departments. The land selected is zoned "Rural Industrial Use".

Fire Fighting Plans for the Proposed Facility

The fire chief from the local Whitbourne Voluntary Fire Department came forward to outline what he qualified as deficiencies in the fire and safety plans included in the Environmental Preview Report and its first addendum. The fire chief pointed out a number of items on these plans.

The fire safety and firefighting aspects of the proposed indoor composting facility were addressed and documented in previously published Environmental Assessment, Environmental Preview and Addendum documents. These plans were developed in consultation with the Fire Commissioner, whom is represented on Environmental Assessment committee of DoMA&E – Environmental Assessment Division.

The fire chief also read a letter that he prepared and sent to Premier Dwight Ball, stating that the Whitbourne Voluntary Fire Department would not respond to any call for emergency services from the proposed composting facility stating that it did not have any legal responsibility in this regard, and neither any other volunteer fire departments from other neighboring towns would have any responsibility.

The Consultant asked for a copy of this letter and for a copy of the marked up fire and emergency response plans so that the Proponent could attempt to address these issues that the fire chief just raised publically, but these documents were not provided to the Proponent or the Consultant.

The Fire Protection Services Act[18] does not grant individual localities the discretion to choose whether or not they would provide services in an emergency situation.

Raw Material Feedstocks and Finished Products

Another member of the attending public asked specifically which raw material feedstock and what specific finished product the Proponent was planning to produce at the proposed composting facility. It certainly appears to be a valid question to have a better idea about the proposed composting and business activities.

The Proponent has already responded to such questions in the previous public information session and in the EPR document and its Addendum 1. There is an entire range of possible and available raw materials in the Province to then make quality compost in bulk for soil amendment initially. But the simple answer remains that, on one hand, this is business confidential information to a large extent, and on the other hand, the Proponent cannot have any confirmed raw material feedstock supply until the Environmental Assessment is released by the minister.

[18] http://www.assembly.nl.ca/Legislation/sr/statutes/f11-01.htm

Other Concerns from Attending Public

Most of the reactions and statements made by the attending public were simply statements of denial of any validity and relevance about the information presented that evening as well as information presented and published previously. Several people came up to speak at the microphone to make political statements and mobilize the attending public to protest the proposal of the composting facility installation at its proposed location. They used the public information session as a political forum.

One long statement was made that the ADM&A had no validity and no relevance using the popular cliché "garbage in – garbage out". Somehow, according to this person, the ADM&A should have been repeated hundreds of time and even then, the reliability of its results would not be necessarily assured.

The Proponent and the Consultant have done the ADM&A as requested by the Minister of Municipal Affairs and Environment, using all the right data and methodology, overseen by the Pollution Prevention Division, to produce accurate and reliable results, all of which was presented to the attending public.

This same person then went on to indicate that the composting facility would spread microbes and pathogens all over the surrounding areas, citing a case or situation associated with a composting facility in Ontario, noting that this facility was located in a residential suburban area.

The Proponent and the Consultant have at length indicated that the proper conductance of the composting process eliminates entirely microbes and pathogens due to the high temperatures reached in the compost piles. The scientific and engineering literature on composting abounds with information relating to the elimination of pathogens in composting. And clearly, if the claims made by this person had any truth or validity, industrial composting would not be practiced as it is throughout the world.

The Town of Placentia issued a letter of opposition to the proposed composting facility on January 18, 2018 to DoMAE, which was copied to the Proponent.

This letter objects to the installation of the composting facility by invoking two reasons that are simply not true or valid. The letter states that the facility will be storing organic waste. This is simply not true. As indicated in the Environmental Assessment and Environmental Preview Reports, organic waste received at the facility will be processed the same day. There will be no storage of organic waste that will rot, cause odor, attract vermin, etc. The letter also invokes the destruction of a large section of forest. This is simply untrue. The most clearing necessary to build the facility will be 3 or 4 acres. And the density of vegetation at the site is not particularly high. Certainly a few cottage lots by a pond will produce more deforestation and destruction to the environment than the installation of the proposed facility on land at far distance from ponds and bodies of water.

11. Conclusion

The Proponent fulfilled the requirements of the DoMAE by performing this in-depth ADM&A as per the exact and extensive prescriptions of the DoMAE- Pollution Prevention Division. The inputs, the processing and the analysis of results of the ADM&A were strictly validated by the DoMAE – Pollution Prevention Division, which has extensive expertise in this domain of science and engineering. The odor concentration inputs to the ADM&A were deliberately grossly overestimated to ensure that the results would be very conservative, and that we were modelling the worst case scenario possible.

Based on the ADM&A executed and documented herein, the results clearly show that the odor from this compost facility will have no impact beyond the immediate site. There was an odor concentration of 0 o.u./m^3 detected at all receptors within all of the nearby communities, including Blaketown, Markland, Placentia Junction, and Whitbourne. These were the expected results of the modelling, and confirm that concerns brought forward have been effectively addressed by this model, fulfilling the air dispersion requirement defined in the letter from the Minister of Municipal Affairs and Environment.

The Proponent also organized and conducted a public information session in Whitbourne to present the scope and results of the ADM&A, and answer any legitimate questions about odor control and dispersion from the proposed facility.

Most legitimate questions could be addressed and discussed at the meeting. But the attending public constantly distracted and interfered with the orderly conduct of the meeting. This report deliberately includes the explanations and information that these legitimate questions raised.

But most of the participation of the attending public in the meeting were statements of denial, disinformation about composting and discretization of the Proponent and of the Consultant. The public information session was used by most of the attending public as a political forum to protest against the proposed installation of the composting facility, discredit the Environmental Assessment process, and voice the statement "not in my backyard".

The greater environmental and economic benefits to the Avalon region from the implementation of the proposed facility must be clearly considered and understood in the environmental review and analysis of this project. These significant benefits are:

1. Reducing disposal of organic waste to landfill and associated greenhouse gas emissions;
2. Recycling two types of solid waste – organics and wood;
3. Reducing the current waste management landfill operating cost and extending the service life of the landfills;
4. Producing value-added products at a lower price than the current supply from the mainland, that are in real demand in Newfoundland;
5. Generating tax revenues to Federal and Provincial coffers.

This proposed industrial composting facility is a great opportunity to improve our environmental stewardship, with clear, substantial, long term benefits that should not be ignored.

12. Appendix 1 – Odor Concentrations at Affected Receptors

Table 1: Top-4 24-Hour Odor Concentrations (all further receptors were excluded since all concentrations are 0)

UTM Easting (km)	UTM Northing (km)	Rank 1 (o.u./m³)	Rank 2 (o.u./m³)	Rank 3 (o.u./m³)	Rank 4 (o.u./m³)
304.746	5254.293	0.68	0.65	0.63	0.61
304.746	5254.344	1.01	1.00	0.93	0.92
304.746	5254.394	1.53	1.43	1.35	1.30
304.746	5254.444	2.28	1.94	1.88	1.79
304.746	5254.494	3.14	2.53	2.52	2.43
304.746	5254.543	4.14	3.24	3.17	3.16
304.746	5254.594	5.20	4.00	3.97	3.80
304.746	5254.644	6.21	4.77	4.73	4.37
304.746	5254.694	7.07	5.50	5.37	4.82
304.746	5254.744	7.64	6.09	5.85	5.11
304.746	5254.793	7.77	6.47	6.12	5.19
304.746	5254.844	7.44	6.59	6.13	5.05
304.746	5254.894	7.02	6.46	5.90	4.73
304.746	5254.944	6.55	6.07	5.45	4.23
304.746	5254.994	5.86	5.47	4.82	3.64
304.746	5255.043	5.04	4.74	4.10	3.01
304.746	5255.094	4.15	3.94	3.34	2.38
304.746	5255.144	3.29	3.15	2.62	1.81
304.746	5255.194	2.49	2.41	1.96	1.32
304.746	5255.244	1.82	1.77	1.41	0.92
304.796	5254.293	1.07	1.01	0.98	0.94
304.796	5254.344	1.61	1.58	1.45	1.43
304.796	5254.394	2.53	2.36	2.07	2.04
304.796	5254.444	3.72	3.40	2.90	2.77
304.796	5254.494	5.25	4.54	3.89	3.73
304.796	5254.543	7.06	5.78	5.00	4.86
304.796	5254.594	8.97	7.04	6.17	6.10
304.796	5254.644	10.65	8.14	7.32	7.30
304.796	5254.694	11.95	8.94	8.45	8.30
304.796	5254.744	12.81	9.36	9.05	8.80
304.796	5254.793	13.06	9.94	9.46	8.11
304.796	5254.844	12.18	10.15	9.49	7.90
304.796	5254.894	10.74	9.94	9.14	7.38
304.796	5254.944	10.02	9.35	8.43	6.61
304.796	5254.994	8.97	8.44	7.48	5.69
304.796	5255.043	7.71	7.32	6.36	4.70
304.796	5255.094	6.36	6.08	5.18	3.71

304.796	5255.144	5.03	4.86	4.06	2.82
304.796	5255.194	3.82	3.72	3.04	2.05
304.796	5255.244	2.79	2.75	2.19	1.43
304.846	5254.293	1.69	1.55	1.48	1.39
304.846	5254.344	2.65	2.62	2.18	2.11
304.846	5254.394	4.20	3.89	3.07	3.07
304.846	5254.444	6.51	5.52	4.30	4.27
304.846	5254.494	9.57	7.64	5.94	5.76
304.846	5254.543	13.27	10.11	7.90	7.40
304.846	5254.594	16.76	12.57	10.03	9.15
304.846	5254.644	20.58	14.68	12.07	10.83
304.846	5254.694	23.76	15.72	13.46	12.98
304.846	5254.744	25.09	15.73	15.26	14.05
304.846	5254.793	24.09	15.93	15.44	14.67
304.846	5254.844	21.95	14.99	14.75	14.43
304.846	5254.894	19.47	14.69	13.57	12.92
304.846	5254.944	17.41	13.82	12.53	10.76
304.846	5254.994	14.93	12.49	11.12	8.53
304.846	5255.043	11.33	10.84	9.46	7.04
304.846	5255.094	9.34	9.02	7.71	5.56
304.846	5255.144	7.40	7.21	6.04	4.23
304.846	5255.194	5.61	5.53	4.53	3.07
304.846	5255.244	4.10	4.08	3.27	2.15
304.896	5254.293	2.60	2.41	2.13	1.97
304.896	5254.344	4.14	4.05	3.14	2.99
304.896	5254.394	6.88	6.20	4.45	4.39
304.896	5254.444	11.14	9.23	6.63	6.20
304.896	5254.494	17.03	13.06	9.62	8.48
304.896	5254.543	25.16	17.57	13.27	11.04
304.896	5254.594	34.16	22.32	17.31	14.60
304.896	5254.644	40.92	26.45	20.45	18.32
304.896	5254.694	44.73	29.13	23.80	22.44
304.896	5254.744	45.35	29.78	28.04	26.55
304.896	5254.793	40.87	29.34	29.06	28.53
304.896	5254.844	35.93	28.56	27.21	24.95
304.896	5254.894	32.05	25.75	22.40	20.82
304.896	5254.944	29.48	21.72	19.60	17.87
304.896	5254.994	25.66	17.72	16.87	15.86
304.896	5255.043	21.15	15.39	13.51	12.01
304.896	5255.094	16.56	12.81	11.03	8.00
304.896	5255.144	12.45	10.26	8.63	6.07
304.896	5255.194	8.73	7.87	6.48	4.41
304.896	5255.244	5.81	5.78	4.68	3.08

304.946	5254.293	3.79	3.55	2.95	2.67
304.946	5254.344	6.33	6.15	4.37	4.13
304.946	5254.394	11.11	9.73	6.65	6.36
304.946	5254.444	19.06	14.92	10.63	9.56
304.946	5254.494	31.69	21.88	16.57	13.80
304.946	5254.543	48.69	30.42	24.35	22.76
304.946	5254.594	67.14	39.69	34.15	33.74
304.946	5254.644	81.93	47.81	43.38	41.46
304.946	5254.694	88.94	52.90	48.40	42.91
304.946	5254.744	83.03	53.78	51.36	46.71
304.946	5254.793	69.92	56.65	50.76	48.73
304.946	5254.844	59.74	56.26	45.29	44.46
304.946	5254.894	53.04	50.94	37.36	36.45
304.946	5254.944	48.51	42.78	28.39	28.08
304.946	5254.994	41.71	32.83	24.58	22.59
304.946	5255.043	33.75	22.92	20.97	18.74
304.946	5255.094	25.80	17.47	15.22	14.95
304.946	5255.144	18.88	14.00	11.89	9.54
304.946	5255.194	13.26	10.75	8.92	6.37
304.946	5255.244	9.06	7.94	6.42	4.25
304.996	5254.293	5.40	5.05	3.91	3.54
304.996	5254.344	9.43	9.02	5.85	5.81
304.996	5254.394	17.57	14.67	10.15	9.23
304.996	5254.444	32.54	23.37	17.61	14.48
304.996	5254.494	56.92	35.56	30.45	26.27
304.996	5254.543	91.05	51.10	49.19	46.32
304.996	5254.594	130.52	71.76	70.62	68.49
304.996	5254.644	162.38	95.83	84.80	83.98
304.996	5254.694	173.63	111.71	94.20	91.41
304.996	5254.744	156.54	110.42	104.40	96.50
304.996	5254.793	129.68	107.68	105.53	101.77
304.996	5254.844	105.87	105.06	97.29	84.61
304.996	5254.894	95.74	89.18	72.99	70.14
304.996	5254.944	78.57	78.20	57.42	46.46
304.996	5254.994	66.85	59.91	43.98	37.62
304.996	5255.043	53.18	41.40	31.81	31.19
304.996	5255.094	39.70	26.27	22.85	22.62
304.996	5255.144	28.24	18.33	15.86	15.80
304.996	5255.194	19.23	14.08	11.82	9.84
304.996	5255.244	12.75	10.41	8.49	6.16
305.046	5254.293	7.28	6.80	5.01	4.67
305.046	5254.344	13.42	12.52	8.37	7.87
305.046	5254.394	26.24	21.04	15.76	13.15

305.046	5254.444	51.63	34.68	30.66	23.96
305.046	5254.494	95.63	56.12	54.55	44.87
305.046	5254.543	160.84	94.53	83.44	80.71
305.046	5254.594	241.27	140.60	135.38	123.58
305.046	5254.644	314.18	190.13	176.02	164.47
305.046	5254.694	348.37	233.36	213.10	175.01
305.046	5254.744	324.57	249.69	247.32	221.10
305.046	5254.793	251.90	250.22	249.49	209.32
305.046	5254.844	211.28	208.70	193.76	182.06
305.046	5254.894	173.61	150.76	148.38	146.71
305.046	5254.944	140.04	128.14	117.96	93.73
305.046	5254.994	104.99	103.23	87.69	73.13
305.046	5255.043	80.85	69.86	60.02	57.22
305.046	5255.094	59.17	43.61	39.16	37.96
305.046	5255.144	41.04	25.34	23.94	23.01
305.046	5255.194	27.13	17.69	15.06	14.40
305.046	5255.244	17.45	13.09	10.78	8.77
305.096	5254.293	9.39	8.64	6.13	5.93
305.096	5254.344	17.67	16.36	11.47	10.33
305.096	5254.394	36.81	28.18	23.40	18.30
305.096	5254.444	75.75	48.26	47.73	35.45
305.096	5254.494	146.24	93.84	77.20	72.42
305.096	5254.543	259.08	165.68	137.44	133.31
305.096	5254.594	414.25	260.45	247.05	224.42
305.096	5254.644	597.18	378.17	356.75	339.42
305.096	5254.694	745.05	469.47	446.76	442.05
305.096	5254.744	718.23	557.86	504.04	484.71
305.096	5254.793	586.04	559.83	506.92	438.32
305.096	5254.844	494.14	425.76	349.13	345.96
305.096	5254.894	341.41	307.60	286.64	272.71
305.096	5254.944	239.27	222.40	206.62	196.77
305.096	5254.994	170.08	159.93	155.40	138.91
305.096	5255.043	117.91	112.36	106.60	94.82
305.096	5255.094	83.53	68.47	65.11	61.23
305.096	5255.144	56.82	38.31	37.00	36.82
305.096	5255.194	36.65	21.33	20.97	20.22
305.096	5255.244	22.94	15.80	13.15	11.91
305.146	5254.293	11.29	10.23	7.20	7.14
305.146	5254.344	21.24	19.88	14.56	12.89
305.146	5254.394	45.68	34.75	31.30	23.92
305.146	5254.444	97.53	67.82	59.98	48.12
305.146	5254.494	195.84	137.89	104.37	99.20
305.146	5254.543	363.55	253.46	198.73	197.83

305.146	5254.594	652.36	434.18	411.92	371.34
305.146	5254.644	1109.50	795.19	688.35	680.86
305.146	5254.694	1649.40	1251.60	1048.50	989.98
305.146	5254.744	1751.10	1339.80	1099.10	1012.50
305.146	5254.793	1242.20	1213.40	1148.70	956.28
305.146	5254.844	1011.10	857.80	707.62	694.46
305.146	5254.894	634.94	524.14	514.47	491.73
305.146	5254.944	387.97	387.03	375.44	357.65
305.146	5254.994	269.84	262.93	245.89	230.57
305.146	5255.043	175.63	166.82	158.86	153.81
305.146	5255.094	110.81	103.10	99.73	87.10
305.146	5255.144	73.51	55.79	55.36	50.30
305.146	5255.194	46.59	28.90	28.83	27.66
305.146	5255.244	28.57	18.29	15.69	15.38
305.196	5254.293	12.70	11.03	8.12	8.11
305.196	5254.344	23.09	22.36	16.83	14.95
305.196	5254.394	50.15	39.18	37.04	28.45
305.196	5254.444	108.68	82.30	68.18	58.24
305.196	5254.494	222.57	172.48	128.88	114.69
305.196	5254.543	434.20	334.17	256.23	239.08
305.196	5254.594	865.54	635.78	542.74	520.93
305.196	5254.644	1782.50	1246.70	1234.90	1201.90
305.196	5254.694	3638.60	2938.60	2576.30	2471.40
305.196	5254.744	5478.50	4925.70	3710.70	3476.10
305.196	5254.793	4240.90	4094.50	3005.00	2929.20
305.196	5254.844	1911.10	1888.50	1855.50	1846.40
305.196	5254.894	1396.00	1377.70	1341.90	1326.40
305.196	5254.944	810.26	808.63	800.18	718.99
305.196	5254.994	473.94	422.85	419.04	403.68
305.196	5255.043	252.08	245.99	245.00	238.26
305.196	5255.094	141.85	137.31	136.46	136.38
305.196	5255.144	88.73	73.83	73.66	70.60
305.196	5255.194	55.47	36.80	35.45	35.27
305.196	5255.244	33.31	20.32	18.93	17.24
305.246	5254.293	13.34	10.91	8.75	8.57
305.246	5254.344	23.30	22.87	17.53	15.91
305.246	5254.394	48.50	40.34	38.33	30.24
305.246	5254.444	104.06	84.81	69.76	58.54
305.246	5254.494	211.93	178.66	131.64	117.91
305.246	5254.543	417.61	355.56	270.39	229.24
305.246	5254.594	848.55	712.79	578.54	554.91
305.246	5254.644	1826.20	1494.00	1353.40	1305.00
305.246	5254.694	4512.60	3692.90	3658.90	3646.90

305.246	5254.744	19857.00	18431.00	17854.00	17243.00
305.246	5254.793	18026.00	16695.00	14832.00	14591.00
305.246	5254.844	25679.00	24489.00	23382.00	22961.00
305.246	5254.894	4424.20	4365.90	3680.80	3632.20
305.246	5254.944	1578.30	1546.30	1480.50	1375.10
305.246	5254.994	711.08	654.64	627.47	617.77
305.246	5255.043	360.76	313.82	312.38	295.52
305.246	5255.094	184.56	170.62	163.43	156.74
305.246	5255.144	99.98	88.59	88.02	83.54
305.246	5255.194	60.67	42.55	39.76	39.47
305.246	5255.244	36.23	21.65	21.48	19.44
305.296	5254.293	13.00	9.89	8.98	8.28
305.296	5254.344	22.32	19.85	16.18	15.22
305.296	5254.394	40.95	37.63	34.15	28.17
305.296	5254.444	85.92	74.07	64.14	53.71
305.296	5254.494	166.97	150.20	108.20	106.50
305.296	5254.543	307.01	280.41	213.46	176.61
305.296	5254.594	550.39	485.83	411.78	389.11
305.296	5254.644	923.72	791.24	789.34	782.41
305.296	5254.694	1576.90	1414.60	1413.40	1293.30
305.296	5254.744	3680.60	3447.30	3287.80	3008.40
305.296	5254.793	5096.60	4005.60	3895.20	3841.90
305.296	5254.844	5878.90	5688.40	5686.60	5357.70
305.296	5254.894	4585.20	4161.70	3847.20	3593.00
305.296	5254.944	2337.80	1858.10	1558.70	1520.10
305.296	5254.994	860.35	823.51	654.57	580.18
305.296	5255.043	419.67	359.61	287.04	279.06
305.296	5255.094	207.34	188.05	162.28	156.23
305.296	5255.144	101.33	95.86	93.84	80.56
305.296	5255.194	61.21	44.14	40.43	40.09
305.296	5255.244	36.30	22.26	21.57	19.85
305.346	5254.293	11.62	8.67	7.97	7.11
305.346	5254.344	19.97	15.83	13.39	13.22
305.346	5254.394	32.44	30.95	26.67	23.35
305.346	5254.444	61.12	55.42	53.48	42.97
305.346	5254.494	106.36	104.16	85.13	74.60
305.346	5254.543	173.94	169.05	134.02	124.58
305.346	5254.594	250.53	245.11	232.07	206.13
305.346	5254.644	438.39	379.56	366.83	358.25
305.346	5254.694	927.92	777.97	775.91	744.32
305.346	5254.744	1336.30	1311.20	1306.50	1258.30
305.346	5254.793	1587.00	1582.20	1519.00	1443.80
305.346	5254.844	1944.40	1894.60	1777.40	1703.20

305.346	5254.894	1999.60	1901.00	1685.60	1648.90
305.346	5254.944	1365.60	1105.90	1070.90	932.11
305.346	5254.994	746.51	592.21	563.93	530.60
305.346	5255.043	387.10	337.10	235.48	234.91
305.346	5255.094	193.49	178.08	149.56	125.25
305.346	5255.144	93.06	88.24	88.18	66.37
305.346	5255.194	56.36	40.94	36.69	36.48
305.346	5255.244	33.70	21.87	19.81	18.90
305.396	5254.293	11.11	8.50	6.90	6.84
305.396	5254.344	15.43	11.65	10.54	9.26
305.396	5254.394	24.11	18.81	16.46	15.98
305.396	5254.444	39.63	35.37	33.38	31.34
305.396	5254.494	63.33	63.14	57.92	56.35
305.396	5254.543	101.42	95.62	94.49	92.05
305.396	5254.594	144.73	140.36	135.78	135.73
305.396	5254.644	227.21	224.08	214.12	209.32
305.396	5254.694	409.58	387.01	385.00	363.66
305.396	5254.744	592.96	576.67	543.07	531.64
305.396	5254.793	723.30	704.61	640.65	626.19
305.396	5254.844	915.41	784.83	705.48	682.27
305.396	5254.894	871.91	858.56	668.09	651.85
305.396	5254.944	761.48	603.69	580.16	553.55
305.396	5254.994	506.03	424.30	346.38	332.87
305.396	5255.043	292.82	263.51	190.27	183.46
305.396	5255.094	148.97	144.22	123.28	90.20
305.396	5255.144	77.69	72.67	68.05	52.76
305.396	5255.194	47.76	33.83	30.02	28.23
305.396	5255.244	29.07	20.58	17.84	16.44
305.446	5254.293	9.84	7.82	5.87	5.51
305.446	5254.344	13.43	10.69	8.13	7.84
305.446	5254.394	17.10	13.73	10.68	9.55
305.446	5254.444	28.63	21.23	20.11	19.26
305.446	5254.494	43.86	39.68	37.36	34.71
305.446	5254.543	68.08	66.94	64.68	56.49
305.446	5254.594	105.45	105.04	89.96	89.50
305.446	5254.644	148.00	145.20	132.75	116.94
305.446	5254.694	202.37	179.66	169.73	166.45
305.446	5254.744	277.13	256.49	253.93	230.03
305.446	5254.793	377.42	364.32	345.66	295.30
305.446	5254.844	457.36	426.85	386.73	281.48
305.446	5254.894	448.03	419.76	375.41	317.23
305.446	5254.944	379.51	362.09	342.23	245.41
305.446	5254.994	288.96	273.41	223.24	191.65

305.446	5255.043	179.34	178.36	136.88	127.98
305.446	5255.094	101.91	94.04	91.67	65.85
305.446	5255.144	59.47	52.72	43.77	38.85
305.446	5255.194	37.63	25.33	24.87	22.85
305.446	5255.244	23.57	18.55	16.12	12.45
305.496	5254.293	7.92	6.65	4.50	4.19
305.496	5254.344	10.59	9.04	5.82	5.76
305.496	5254.394	13.40	11.79	7.67	7.02
305.496	5254.444	20.93	16.91	13.88	12.96
305.496	5254.494	31.38	26.06	23.09	23.02
305.496	5254.543	44.98	44.59	42.39	32.02
305.496	5254.594	68.90	66.59	59.27	52.19
305.496	5254.644	93.83	88.60	73.82	72.57
305.496	5254.694	122.47	105.56	87.91	87.41
305.496	5254.744	163.00	124.67	119.18	109.67
305.496	5254.793	225.92	180.95	173.31	135.00
305.496	5254.844	254.80	226.04	193.57	154.56
305.496	5254.894	248.91	225.13	163.82	163.27
305.496	5254.944	214.71	181.86	170.82	147.17
305.496	5254.994	163.44	138.01	125.79	120.13
305.496	5255.043	109.35	90.16	89.78	76.68
305.496	5255.094	64.35	62.89	49.08	41.59
305.496	5255.144	42.58	34.20	28.80	27.05
305.496	5255.194	28.04	21.74	19.56	16.49
305.496	5255.244	18.21	16.03	13.94	10.15
305.546	5254.293	5.83	5.23	3.37	3.01
305.546	5254.344	8.05	7.30	4.20	4.07
305.546	5254.394	10.53	9.70	5.69	5.13
305.546	5254.444	16.01	13.93	9.12	8.93
305.546	5254.494	22.14	18.51	15.57	13.80
305.546	5254.543	31.00	27.13	24.50	24.09
305.546	5254.594	38.18	37.99	34.91	28.77
305.546	5254.644	54.81	49.14	47.68	39.73
305.546	5254.694	72.83	61.84	56.81	49.07
305.546	5254.744	98.85	73.38	66.86	64.06
305.546	5254.793	128.11	87.94	84.64	78.91
305.546	5254.844	142.76	107.08	93.63	87.36
305.546	5254.894	138.18	106.48	91.06	79.87
305.546	5254.944	118.50	88.09	84.41	66.77
305.546	5254.994	90.65	71.40	63.71	55.83
305.546	5255.043	61.55	55.91	40.66	38.13
305.546	5255.094	41.22	37.05	29.63	28.76
305.546	5255.144	29.30	23.41	21.85	20.15

305.546	5255.194	20.17	17.91	16.17	12.46
305.546	5255.244	13.60	13.29	11.64	8.64
305.596	5254.293	4.63	4.17	3.04	2.24
305.596	5254.344	5.92	5.60	3.50	2.90
305.596	5254.394	8.31	7.87	4.34	4.03
305.596	5254.444	11.78	10.98	6.53	6.21
305.596	5254.494	16.37	14.58	9.33	9.26
305.596	5254.543	21.90	18.55	14.97	13.04
305.596	5254.594	27.52	22.63	22.44	19.80
305.596	5254.644	31.70	29.12	25.78	25.18
305.596	5254.694	41.80	38.00	34.18	29.38
305.596	5254.744	54.83	43.96	40.85	36.52
305.596	5254.793	70.02	49.33	45.07	44.82
305.596	5254.844	75.44	50.76	49.66	47.14
305.596	5254.894	71.73	51.76	46.10	45.90
305.596	5254.944	61.66	48.75	40.00	39.27
305.596	5254.994	47.15	42.43	32.88	32.70
305.596	5255.043	34.63	32.28	27.58	27.48
305.596	5255.094	26.75	22.92	22.08	19.71
305.596	5255.144	19.87	18.39	17.17	14.19
305.596	5255.194	14.20	14.18	12.86	10.16
305.596	5255.244	10.56	9.92	9.34	7.06
305.646	5254.293	3.82	3.35	2.71	1.83
305.646	5254.344	4.46	4.25	3.11	2.04
305.646	5254.394	6.59	6.13	3.54	3.17
305.646	5254.444	8.89	8.26	4.50	4.35
305.646	5254.494	12.06	11.01	6.41	6.35
305.646	5254.543	14.94	13.62	8.36	8.23
305.646	5254.594	18.62	16.64	11.16	11.08
305.646	5254.644	21.63	18.90	14.38	13.83
305.646	5254.694	25.38	21.12	19.12	17.77
305.646	5254.744	29.02	25.62	23.06	21.94
305.646	5254.793	33.16	32.30	26.62	25.11
305.646	5254.844	36.15	32.81	29.57	27.44
305.646	5254.894	35.18	31.42	30.53	28.15
305.646	5254.944	29.27	28.68	27.49	26.21
305.646	5254.994	25.45	23.27	22.88	22.71
305.646	5255.043	21.40	19.89	19.77	18.54
305.646	5255.094	16.84	16.35	15.81	14.19
305.646	5255.144	13.21	12.92	12.42	10.66
305.646	5255.194	10.24	9.55	9.38	7.69
305.646	5255.244	7.82	6.97	6.83	5.42
305.696	5254.293	2.69	2.38	2.37	1.17

305.696	5254.344	3.58	3.28	2.73	1.54
305.696	5254.394	5.02	4.60	3.11	2.27
305.696	5254.444	7.11	6.36	3.49	3.45
305.696	5254.494	9.61	8.44	5.03	4.81
305.696	5254.543	11.90	10.44	6.52	6.28
305.696	5254.594	14.16	12.38	8.13	7.88
305.696	5254.644	16.14	14.03	9.72	9.48
305.696	5254.694	17.67	15.25	11.18	10.96
305.696	5254.744	17.71	15.43	11.61	11.46
305.696	5254.793	19.53	16.31	13.99	13.47
305.696	5254.844	20.44	16.43	16.04	14.82
305.696	5254.894	20.78	17.99	16.66	16.03
305.696	5254.944	18.90	17.40	16.53	16.05
305.696	5254.994	16.08	15.54	15.38	15.14
305.696	5255.043	12.84	12.83	12.82	12.81
305.696	5255.094	10.80	10.54	10.26	10.04
305.696	5255.144	8.77	8.32	7.93	7.57
305.696	5255.194	6.82	6.29	5.93	5.46
305.696	5255.244	5.30	4.76	4.47	3.88
304.246	5253.793	0.00	0.00	0.00	0.00
304.246	5253.894	0.01	0.00	0.00	0.00
304.246	5253.994	0.01	0.00	0.00	0.00
304.246	5254.094	0.01	0.01	0.00	0.00
304.246	5254.194	0.01	0.01	0.01	0.00
304.246	5254.293	0.02	0.02	0.01	0.01
304.246	5254.394	0.02	0.02	0.01	0.01
304.246	5254.494	0.03	0.02	0.01	0.01
304.246	5254.594	0.04	0.02	0.02	0.01
304.246	5254.694	0.13	0.05	0.02	0.01
304.246	5254.793	0.19	0.05	0.03	0.01
304.246	5254.894	0.19	0.04	0.03	0.01
304.246	5254.994	0.17	0.02	0.01	0.01
304.246	5255.094	0.15	0.02	0.01	0.01
304.246	5255.194	0.12	0.02	0.01	0.01
304.246	5255.293	0.09	0.02	0.01	0.00
304.246	5255.394	0.07	0.02	0.01	0.00
304.246	5255.494	0.05	0.01	0.00	0.00
304.246	5255.594	0.03	0.01	0.00	0.00
304.246	5255.694	0.01	0.01	0.00	0.00
304.346	5253.793	0.01	0.00	0.00	0.00
304.346	5253.894	0.01	0.00	0.00	0.00
304.346	5253.994	0.01	0.01	0.00	0.00
304.346	5254.094	0.01	0.01	0.01	0.01

304.346	5254.194	0.02	0.02	0.01	0.01
304.346	5254.293	0.03	0.02	0.02	0.01
304.346	5254.394	0.04	0.03	0.02	0.02
304.346	5254.494	0.06	0.03	0.02	0.02
304.346	5254.594	0.07	0.04	0.03	0.02
304.346	5254.694	0.20	0.08	0.04	0.02
304.346	5254.793	0.32	0.09	0.05	0.03
304.346	5254.894	0.30	0.07	0.05	0.02
304.346	5254.994	0.27	0.04	0.03	0.02
304.346	5255.094	0.24	0.03	0.02	0.01
304.346	5255.194	0.20	0.03	0.02	0.01
304.346	5255.293	0.15	0.02	0.01	0.01
304.346	5255.394	0.11	0.02	0.01	0.01
304.346	5255.494	0.08	0.02	0.01	0.00
304.346	5255.594	0.05	0.01	0.00	0.00
304.346	5255.694	0.03	0.01	0.00	0.00
304.446	5253.793	0.01	0.00	0.00	0.00
304.446	5253.894	0.01	0.01	0.00	0.00
304.446	5253.994	0.01	0.01	0.01	0.01
304.446	5254.094	0.02	0.02	0.01	0.01
304.446	5254.194	0.04	0.02	0.02	0.01
304.446	5254.293	0.06	0.03	0.03	0.02
304.446	5254.394	0.08	0.04	0.03	0.03
304.446	5254.494	0.10	0.07	0.04	0.03
304.446	5254.594	0.13	0.09	0.05	0.04
304.446	5254.694	0.29	0.15	0.10	0.04
304.446	5254.793	0.49	0.16	0.10	0.04
304.446	5254.894	0.47	0.13	0.10	0.04
304.446	5254.994	0.42	0.09	0.05	0.04
304.446	5255.094	0.37	0.07	0.03	0.02
304.446	5255.194	0.30	0.05	0.03	0.02
304.446	5255.293	0.24	0.04	0.02	0.01
304.446	5255.394	0.18	0.03	0.01	0.01
304.446	5255.494	0.12	0.02	0.01	0.01
304.446	5255.594	0.08	0.02	0.01	0.00
304.446	5255.694	0.05	0.01	0.00	0.00
304.546	5253.793	0.01	0.01	0.00	0.00
304.546	5253.894	0.01	0.01	0.01	0.01
304.546	5253.994	0.02	0.02	0.01	0.01
304.546	5254.094	0.04	0.02	0.02	0.01
304.546	5254.194	0.06	0.04	0.03	0.02
304.546	5254.293	0.09	0.06	0.04	0.03
304.546	5254.394	0.13	0.09	0.05	0.04

304.546	5254.494	0.17	0.13	0.05	0.05
304.546	5254.594	0.26	0.23	0.22	0.21
304.546	5254.694	0.74	0.65	0.62	0.54
304.546	5254.793	0.86	0.76	0.71	0.71
304.546	5254.894	0.84	0.76	0.68	0.68
304.546	5254.994	0.62	0.43	0.39	0.34
304.546	5255.094	0.54	0.13	0.05	0.05
304.546	5255.194	0.44	0.10	0.04	0.03
304.546	5255.293	0.35	0.08	0.03	0.02
304.546	5255.394	0.26	0.05	0.02	0.02
304.546	5255.494	0.18	0.03	0.02	0.01
304.546	5255.594	0.12	0.02	0.01	0.01
304.546	5255.694	0.08	0.02	0.01	0.00
304.646	5253.793	0.08	0.01	0.01	0.00
304.646	5253.894	0.06	0.02	0.01	0.01
304.646	5253.994	0.03	0.03	0.02	0.01
304.646	5254.094	0.06	0.04	0.03	0.02
304.646	5254.194	0.09	0.06	0.04	0.03
304.646	5254.293	0.14	0.09	0.05	0.04
304.646	5254.394	0.29	0.26	0.26	0.25
304.646	5254.494	1.06	0.93	0.91	0.91
304.646	5254.594	1.70	1.49	1.48	1.37
304.646	5254.694	2.33	2.06	1.99	1.74
304.646	5254.793	2.69	2.41	2.26	1.88
304.646	5254.894	2.65	2.40	2.17	1.71
304.646	5254.994	2.21	2.03	1.77	1.32
304.646	5255.094	1.56	1.46	1.23	0.86
304.646	5255.194	0.62	0.61	0.59	0.48
304.646	5255.293	0.48	0.13	0.05	0.05
304.646	5255.394	0.36	0.08	0.03	0.02
304.646	5255.494	0.25	0.05	0.02	0.02
304.646	5255.594	0.17	0.03	0.01	0.01
304.646	5255.694	0.11	0.02	0.01	0.01
304.746	5253.793	0.15	0.01	0.01	0.01
304.746	5253.894	0.19	0.03	0.02	0.01
304.746	5253.994	0.18	0.05	0.03	0.02
304.746	5254.094	0.13	0.08	0.04	0.03
304.746	5254.194	0.14	0.10	0.05	0.04
304.746	5255.293	1.27	1.25	0.98	0.64
304.746	5255.394	0.47	0.13	0.06	0.05
304.746	5255.494	0.34	0.08	0.03	0.02
304.746	5255.594	0.23	0.03	0.02	0.02
304.746	5255.694	0.14	0.02	0.01	0.01

304.846	5253.793	0.17	0.02	0.01	0.01
304.846	5253.894	0.25	0.04	0.02	0.01
304.846	5253.994	0.34	0.07	0.03	0.02
304.846	5254.094	0.42	0.11	0.05	0.04
304.846	5254.194	0.39	0.37	0.34	0.31
304.846	5255.293	2.89	2.87	2.26	1.44
304.846	5255.394	1.28	1.24	0.67	0.60
304.846	5255.494	0.42	0.12	0.04	0.03
304.846	5255.594	0.28	0.06	0.03	0.02
304.846	5255.694	0.18	0.03	0.02	0.01
304.946	5253.793	0.19	0.02	0.02	0.01
304.946	5253.894	0.27	0.05	0.03	0.02
304.946	5253.994	0.38	0.09	0.04	0.03
304.946	5254.094	0.52	0.14	0.07	0.06
304.946	5254.194	1.38	1.21	1.08	1.03
304.946	5255.293	5.92	5.63	4.45	2.85
304.946	5255.394	2.50	2.38	1.88	1.13
304.946	5255.494	0.94	0.87	0.50	0.14
304.946	5255.594	0.34	0.07	0.03	0.03
304.946	5255.694	0.22	0.03	0.02	0.02
305.046	5253.793	0.21	0.03	0.02	0.01
305.046	5253.894	0.30	0.06	0.03	0.02
305.046	5253.994	0.42	0.11	0.05	0.04
305.046	5254.094	0.58	0.45	0.42	0.32
305.046	5254.194	2.49	2.04	1.85	1.68
305.046	5255.293	10.99	9.31	7.45	5.12
305.046	5255.394	4.15	4.10	3.14	1.89
305.046	5255.494	1.57	1.42	0.82	0.57
305.046	5255.594	0.39	0.37	0.33	0.07
305.046	5255.694	0.25	0.04	0.02	0.02
305.146	5253.793	0.21	0.03	0.02	0.01
305.146	5253.894	0.31	0.07	0.03	0.02
305.146	5253.994	0.44	0.13	0.05	0.04
305.146	5254.094	1.02	0.66	0.62	0.44
305.146	5254.194	3.68	2.94	2.58	2.34
305.146	5255.293	17.14	13.02	10.58	8.39
305.146	5255.394	5.99	5.83	4.46	2.71
305.146	5255.494	2.21	1.95	1.60	0.66
305.146	5255.594	1.12	0.71	0.45	0.42
305.146	5255.694	0.87	0.27	0.04	0.02
305.246	5253.793	0.22	0.03	0.02	0.01
305.246	5253.894	0.31	0.07	0.04	0.03
305.246	5253.994	0.45	0.21	0.14	0.06

305.246	5254.094	1.40	1.25	0.86	0.78
305.246	5254.194	4.47	3.59	2.86	2.77
305.246	5255.293	21.20	15.44	12.72	11.01
305.246	5255.394	7.14	6.93	5.36	3.37
305.246	5255.494	2.64	2.29	2.26	1.93
305.246	5255.594	1.47	0.86	0.71	0.44
305.246	5255.694	0.89	0.27	0.18	0.04
305.346	5253.793	0.22	0.21	0.03	0.02
305.346	5253.894	0.75	0.30	0.07	0.04
305.346	5253.994	1.35	0.44	0.22	0.13
305.346	5254.094	2.12	1.47	1.30	0.63
305.346	5254.194	4.41	3.69	3.14	2.61
305.346	5255.293	20.00	15.50	12.93	10.30
305.346	5255.394	6.98	6.89	5.47	3.41
305.346	5255.494	2.67	2.22	2.21	1.97
305.346	5255.594	1.42	0.87	0.70	0.45
305.346	5255.694	0.85	0.27	0.18	0.04
305.446	5253.793	0.41	0.19	0.03	0.02
305.446	5253.894	0.73	0.28	0.06	0.03
305.446	5253.994	1.23	0.41	0.23	0.20
305.446	5254.094	1.93	1.33	1.15	0.59
305.446	5254.194	3.87	3.30	2.85	2.24
305.446	5255.293	14.65	13.19	11.11	7.66
305.446	5255.394	5.96	5.41	4.73	3.00
305.446	5255.494	2.29	2.01	1.84	1.71
305.446	5255.594	1.29	0.75	0.58	0.39
305.446	5255.694	0.78	0.25	0.16	0.04
305.546	5253.793	0.35	0.18	0.02	0.02
305.546	5253.894	0.63	0.25	0.05	0.03
305.546	5253.994	1.05	0.37	0.18	0.15
305.546	5254.094	1.65	0.97	0.84	0.54
305.546	5254.194	2.80	2.43	2.39	1.45
305.546	5255.293	9.51	8.97	8.10	5.76
305.546	5255.394	4.31	3.55	3.47	2.53
305.546	5255.494	1.72	1.66	1.30	1.26
305.546	5255.594	1.10	0.55	0.34	0.30
305.546	5255.694	0.66	0.22	0.06	0.02
305.646	5253.793	0.29	0.15	0.02	0.02
305.646	5253.894	0.51	0.22	0.04	0.02
305.646	5253.994	0.84	0.31	0.10	0.08
305.646	5254.094	1.33	0.67	0.56	0.46
305.646	5254.194	1.96	1.88	1.56	0.67
305.646	5255.293	5.62	4.86	4.60	3.61

305.646	5255.394	2.56	2.09	2.03	2.02
305.646	5255.494	1.38	0.94	0.73	0.73
305.646	5255.594	0.88	0.35	0.32	0.29
305.646	5255.694	0.53	0.21	0.18	0.01
305.746	5253.793	0.22	0.13	0.01	0.01
305.746	5253.894	0.38	0.18	0.03	0.02
305.746	5253.994	0.64	0.25	0.06	0.03
305.746	5254.094	1.01	0.38	0.37	0.31
305.746	5254.194	1.49	1.05	0.85	0.50
305.746	5254.293	2.05	1.97	1.72	0.82
305.746	5254.394	3.86	3.41	2.69	1.72
305.746	5254.494	7.33	6.22	3.80	3.45
305.746	5254.594	11.65	9.51	6.94	6.10
305.746	5254.694	15.02	11.99	10.05	8.76
305.746	5254.793	15.34	12.24	11.09	10.01
305.746	5254.894	11.63	9.76	8.53	8.40
305.746	5254.994	10.39	9.13	8.83	8.52
305.746	5255.094	6.67	6.57	6.45	6.14
305.746	5255.194	4.38	4.08	3.88	3.74
305.746	5255.293	2.48	2.18	2.13	2.08
305.746	5255.394	1.54	1.18	0.98	0.94
305.746	5255.494	1.05	0.46	0.40	0.36
305.746	5255.594	0.67	0.29	0.23	0.12
305.746	5255.694	0.40	0.22	0.15	0.01
305.846	5253.793	0.15	0.11	0.01	0.01
305.846	5253.894	0.27	0.15	0.02	0.01
305.846	5253.994	0.46	0.20	0.04	0.02
305.846	5254.094	0.72	0.27	0.11	0.08
305.846	5254.194	1.06	0.53	0.41	0.36
305.846	5254.293	1.48	1.19	0.93	0.48
305.846	5254.394	1.91	1.66	1.47	0.64
305.846	5254.494	3.34	2.77	2.38	1.55
305.846	5254.594	5.71	4.43	3.22	2.79
305.846	5254.694	7.70	5.75	5.04	4.15
305.846	5254.793	8.28	6.07	6.06	5.21
305.846	5254.894	6.68	5.10	5.02	4.59
305.846	5254.994	3.74	3.10	2.79	2.77
305.846	5255.094	2.65	2.42	2.21	2.20
305.846	5255.194	1.97	1.61	1.57	1.53
305.846	5255.293	1.52	0.93	0.83	0.80
305.846	5255.394	1.10	0.48	0.41	0.40
305.846	5255.494	0.75	0.31	0.26	0.14
305.846	5255.594	0.48	0.24	0.17	0.01

305.846	5255.694	0.29	0.18	0.11	0.01
305.946	5253.793	0.08	0.05	0.01	0.00
305.946	5253.894	0.18	0.12	0.01	0.01
305.946	5253.994	0.31	0.16	0.02	0.02
305.946	5254.094	0.48	0.21	0.04	0.02
305.946	5254.194	0.72	0.27	0.12	0.09
305.946	5254.293	1.00	0.50	0.38	0.35
305.946	5254.394	1.30	0.85	0.67	0.43
305.946	5254.494	1.60	1.23	1.03	0.53
305.946	5254.594	2.07	1.87	1.62	1.01
305.946	5254.694	2.95	2.17	2.06	1.74
305.946	5254.793	3.10	2.25	2.13	2.03
305.946	5254.894	2.50	2.06	1.85	1.72
305.946	5254.994	1.88	1.50	1.19	0.99
305.946	5255.094	1.62	0.96	0.75	0.71
305.946	5255.194	1.32	0.57	0.52	0.50
305.946	5255.293	1.02	0.39	0.35	0.32
305.946	5255.394	0.74	0.31	0.26	0.12
305.946	5255.494	0.50	0.24	0.18	0.01
305.946	5255.594	0.32	0.19	0.12	0.01
305.946	5255.694	0.19	0.14	0.08	0.00
306.046	5253.793	0.06	0.01	0.00	0.00
306.046	5253.894	0.09	0.06	0.01	0.00
306.046	5253.994	0.19	0.12	0.01	0.01
306.046	5254.094	0.31	0.16	0.02	0.02
306.046	5254.194	0.45	0.20	0.04	0.02
306.046	5254.293	0.63	0.25	0.09	0.06
306.046	5254.394	0.82	0.31	0.28	0.22
306.046	5254.494	1.01	0.38	0.36	0.32
306.046	5254.594	1.18	0.62	0.50	0.41
306.046	5254.694	1.30	0.88	0.66	0.45
306.046	5254.793	1.34	0.93	0.68	0.52
306.046	5254.894	1.30	0.75	0.57	0.47
306.046	5254.994	1.19	0.48	0.44	0.43
306.046	5255.094	1.02	0.39	0.37	0.31
306.046	5255.194	0.84	0.33	0.31	0.15
306.046	5255.293	0.64	0.28	0.24	0.02
306.046	5255.394	0.47	0.23	0.18	0.01
306.046	5255.494	0.32	0.18	0.13	0.01
306.046	5255.594	0.20	0.14	0.09	0.00
306.046	5255.694	0.12	0.11	0.05	0.00
306.146	5253.793	0.05	0.00	0.00	0.00
306.146	5253.894	0.07	0.01	0.00	0.00

306.146	5253.994	0.12	0.09	0.01	0.00
306.146	5254.094	0.18	0.12	0.01	0.01
306.146	5254.194	0.27	0.15	0.02	0.02
306.146	5254.293	0.37	0.18	0.04	0.02
306.146	5254.394	0.49	0.21	0.05	0.02
306.146	5254.494	0.60	0.25	0.10	0.07
306.146	5254.594	0.70	0.28	0.16	0.13
306.146	5254.694	0.77	0.30	0.23	0.17
306.146	5254.793	0.80	0.31	0.24	0.20
306.146	5254.894	0.77	0.31	0.30	0.19
306.146	5254.994	0.70	0.29	0.28	0.13
306.146	5255.094	0.61	0.26	0.24	0.02
306.146	5255.194	0.50	0.23	0.20	0.01
306.146	5255.293	0.38	0.20	0.16	0.01
306.146	5255.394	0.28	0.17	0.12	0.01
306.146	5255.494	0.19	0.14	0.08	0.00
306.146	5255.594	0.12	0.11	0.06	0.00
306.146	5255.694	0.08	0.04	0.00	0.00
303.246	5252.793	0.00	0.00	0.00	0.00
303.246	5252.994	0.00	0.00	0.00	0.00
303.246	5253.194	0.00	0.00	0.00	0.00
303.246	5253.394	0.00	0.00	0.00	0.00
303.246	5253.594	0.00	0.00	0.00	0.00
303.246	5253.793	0.00	0.00	0.00	0.00
303.246	5253.994	0.00	0.00	0.00	0.00
303.246	5254.194	0.00	0.00	0.00	0.00
303.246	5254.394	0.00	0.00	0.00	0.00
303.246	5254.594	0.00	0.00	0.00	0.00
303.246	5254.793	0.00	0.00	0.00	0.00
303.246	5254.994	0.00	0.00	0.00	0.00
303.246	5255.194	0.00	0.00	0.00	0.00
303.246	5255.394	0.00	0.00	0.00	0.00
303.246	5255.594	0.00	0.00	0.00	0.00
303.246	5255.793	0.00	0.00	0.00	0.00
303.246	5255.994	0.00	0.00	0.00	0.00
303.246	5256.194	0.00	0.00	0.00	0.00
303.246	5256.394	0.00	0.00	0.00	0.00
303.246	5256.594	0.00	0.00	0.00	0.00
303.246	5256.793	0.00	0.00	0.00	0.00
303.446	5252.793	0.00	0.00	0.00	0.00
303.446	5252.994	0.00	0.00	0.00	0.00
303.446	5253.194	0.00	0.00	0.00	0.00
303.446	5253.394	0.00	0.00	0.00	0.00

303.446	5253.594	0.00	0.00	0.00	0.00
303.446	5253.793	0.00	0.00	0.00	0.00
303.446	5253.994	0.00	0.00	0.00	0.00
303.446	5254.194	0.00	0.00	0.00	0.00
303.446	5254.394	0.00	0.00	0.00	0.00
303.446	5254.594	0.00	0.00	0.00	0.00
303.446	5254.793	0.00	0.00	0.00	0.00
303.446	5254.994	0.00	0.00	0.00	0.00
303.446	5255.194	0.00	0.00	0.00	0.00
303.446	5255.394	0.00	0.00	0.00	0.00
303.446	5255.594	0.00	0.00	0.00	0.00
303.446	5255.793	0.00	0.00	0.00	0.00
303.446	5255.994	0.00	0.00	0.00	0.00
303.446	5256.194	0.00	0.00	0.00	0.00
303.446	5256.394	0.00	0.00	0.00	0.00
303.446	5256.594	0.00	0.00	0.00	0.00
303.446	5256.793	0.00	0.00	0.00	0.00
303.646	5252.793	0.00	0.00	0.00	0.00
303.646	5252.994	0.00	0.00	0.00	0.00
303.646	5253.194	0.00	0.00	0.00	0.00
303.646	5253.394	0.00	0.00	0.00	0.00
303.646	5253.594	0.00	0.00	0.00	0.00
303.646	5253.793	0.00	0.00	0.00	0.00
303.646	5253.994	0.00	0.00	0.00	0.00
303.646	5254.194	0.00	0.00	0.00	0.00
303.646	5254.394	0.00	0.00	0.00	0.00
303.646	5254.594	0.00	0.00	0.00	0.00
303.646	5254.793	0.00	0.00	0.00	0.00
303.646	5254.994	0.00	0.00	0.00	0.00
303.646	5255.194	0.00	0.00	0.00	0.00
303.646	5255.394	0.00	0.00	0.00	0.00
303.646	5255.594	0.00	0.00	0.00	0.00
303.646	5255.793	0.00	0.00	0.00	0.00
303.646	5255.994	0.00	0.00	0.00	0.00
303.646	5256.194	0.00	0.00	0.00	0.00
303.646	5256.394	0.00	0.00	0.00	0.00
303.646	5256.594	0.00	0.00	0.00	0.00
303.646	5256.793	0.00	0.00	0.00	0.00
303.846	5252.793	0.00	0.00	0.00	0.00
303.846	5252.994	0.00	0.00	0.00	0.00
303.846	5253.194	0.00	0.00	0.00	0.00
303.846	5253.394	0.00	0.00	0.00	0.00
303.846	5253.594	0.00	0.00	0.00	0.00

303.846	5253.793	0.00	0.00	0.00	0.00
303.846	5253.994	0.00	0.00	0.00	0.00
303.846	5254.194	0.00	0.00	0.00	0.00
303.846	5254.394	0.00	0.00	0.00	0.00
303.846	5254.594	0.01	0.00	0.00	0.00
303.846	5254.793	0.01	0.00	0.00	0.00
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303.846	5255.194	0.00	0.00	0.00	0.00
303.846	5255.394	0.00	0.00	0.00	0.00
303.846	5255.594	0.00	0.00	0.00	0.00
303.846	5255.793	0.00	0.00	0.00	0.00
303.846	5255.994	0.00	0.00	0.00	0.00
303.846	5256.194	0.00	0.00	0.00	0.00
303.846	5256.394	0.00	0.00	0.00	0.00
303.846	5256.594	0.00	0.00	0.00	0.00
303.846	5256.793	0.00	0.00	0.00	0.00
304.046	5252.793	0.00	0.00	0.00	0.00
304.046	5252.994	0.00	0.00	0.00	0.00
304.046	5253.194	0.00	0.00	0.00	0.00
304.046	5253.394	0.00	0.00	0.00	0.00
304.046	5253.594	0.00	0.00	0.00	0.00
304.046	5253.793	0.00	0.00	0.00	0.00
304.046	5253.994	0.00	0.00	0.00	0.00
304.046	5254.194	0.01	0.00	0.00	0.00
304.046	5254.394	0.01	0.00	0.00	0.00
304.046	5254.594	0.01	0.01	0.00	0.00
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304.046	5255.994	0.00	0.00	0.00	0.00
304.046	5256.194	0.00	0.00	0.00	0.00
304.046	5256.394	0.00	0.00	0.00	0.00
304.046	5256.594	0.00	0.00	0.00	0.00
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304.246	5252.793	0.00	0.00	0.00	0.00
304.246	5252.994	0.00	0.00	0.00	0.00
304.246	5253.194	0.00	0.00	0.00	0.00
304.246	5253.394	0.00	0.00	0.00	0.00
304.246	5253.594	0.00	0.00	0.00	0.00
304.246	5253.793	0.00	0.00	0.00	0.00

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304.246	5254.594	0.04	0.02	0.02	0.01
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304.246	5255.594	0.03	0.01	0.00	0.00
304.246	5255.793	0.01	0.00	0.00	0.00
304.246	5255.994	0.00	0.00	0.00	0.00
304.246	5256.194	0.00	0.00	0.00	0.00
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304.446	5256.793	0.00	0.00	0.00	0.00
304.646	5252.793	0.00	0.00	0.00	0.00
304.646	5252.994	0.00	0.00	0.00	0.00
304.646	5253.194	0.00	0.00	0.00	0.00
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304.646	5256.394	0.00	0.00	0.00	0.00
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304.846	5252.793	0.00	0.00	0.00	0.00
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304.846	5253.793	0.17	0.02	0.01	0.01

304.846	5255.994	0.04	0.01	0.00	0.00
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304.846	5256.394	0.00	0.00	0.00	0.00
304.846	5256.594	0.00	0.00	0.00	0.00
304.846	5256.793	0.00	0.00	0.00	0.00
305.046	5252.793	0.00	0.00	0.00	0.00
305.046	5252.994	0.00	0.00	0.00	0.00
305.046	5253.194	0.01	0.00	0.00	0.00
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305.246	5256.594	0.00	0.00	0.00	0.00
305.246	5256.793	0.00	0.00	0.00	0.00
305.446	5252.793	0.00	0.00	0.00	0.00
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305.446	5255.994	0.08	0.05	0.01	0.00
305.446	5256.194	0.00	0.00	0.00	0.00
305.446	5256.394	0.00	0.00	0.00	0.00
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305.646	5252.793	0.00	0.00	0.00	0.00
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305.646	5256.594	0.00	0.00	0.00	0.00
305.646	5256.793	0.00	0.00	0.00	0.00
305.846	5252.793	0.00	0.00	0.00	0.00
305.846	5252.994	0.00	0.00	0.00	0.00
305.846	5253.194	0.00	0.00	0.00	0.00
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306.046	5253.594	0.03	0.00	0.00	0.00
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306.446	5254.194	0.05	0.00	0.00	0.00
306.446	5254.394	0.07	0.01	0.00	0.00
306.446	5254.594	0.10	0.09	0.01	0.00
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306.646	5254.793	0.04	0.00	0.00	0.00
306.646	5254.994	0.04	0.00	0.00	0.00
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306.846	5252.994	0.00	0.00	0.00	0.00
306.846	5253.194	0.00	0.00	0.00	0.00
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306.846	5253.994	0.00	0.00	0.00	0.00
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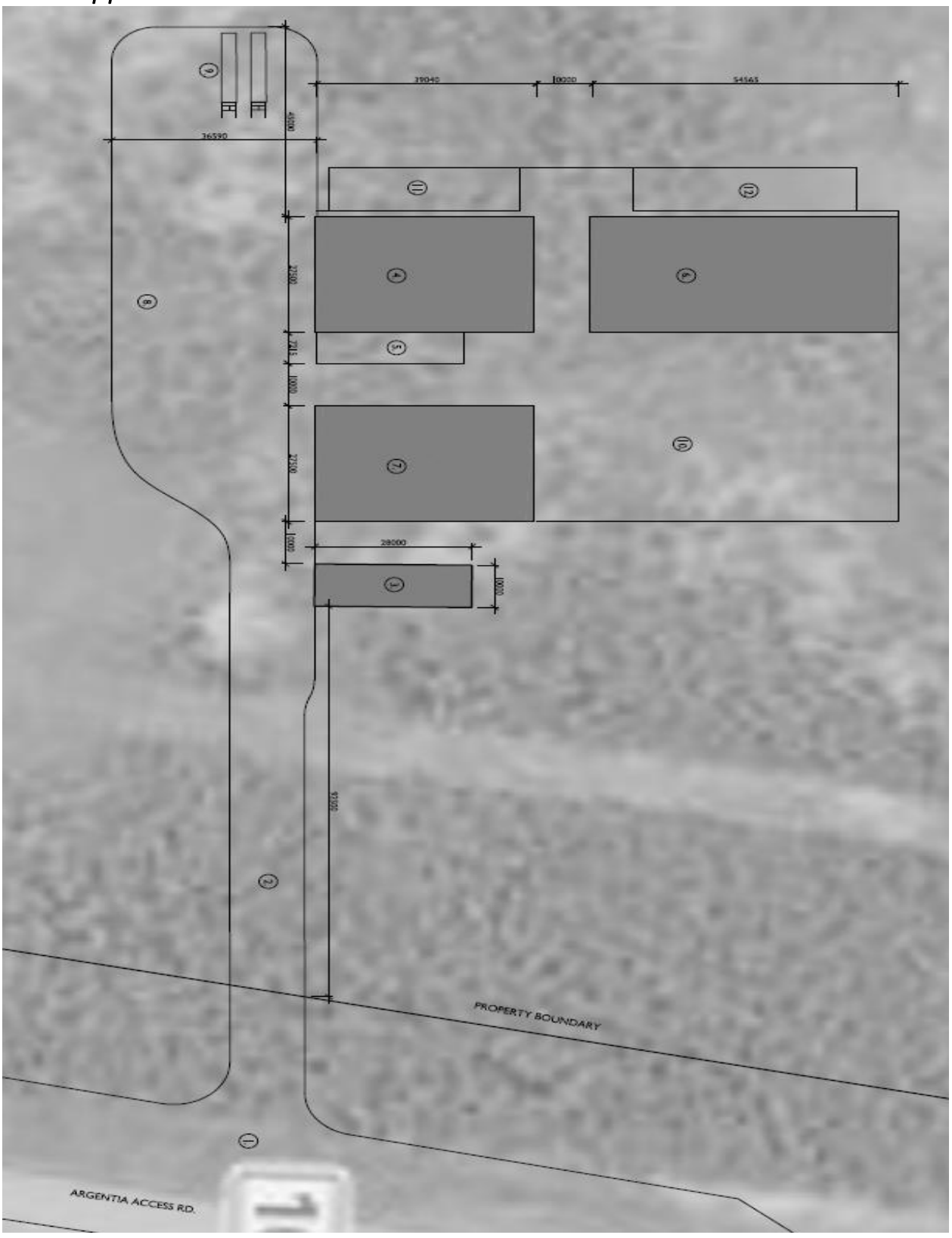
307.246	5254.994	0.00	0.00	0.00	0.00
307.246	5255.194	0.00	0.00	0.00	0.00
307.246	5255.394	0.00	0.00	0.00	0.00
307.246	5255.594	0.00	0.00	0.00	0.00
307.246	5255.793	0.00	0.00	0.00	0.00
307.246	5255.994	0.00	0.00	0.00	0.00
307.246	5256.194	0.00	0.00	0.00	0.00
307.246	5256.394	0.00	0.00	0.00	0.00
307.246	5256.594	0.00	0.00	0.00	0.00
307.246	5256.793	0.00	0.00	0.00	0.00

13. Appendix 2 – Site Plan



14. Appendix 3 – CALMET-CALPUFF Input Files

The details of the input files used for ADM&A processing in CALMET and in CALPUFF are presented in a separate attachment. Rather than including this data in this document, a separated document was generated due to the large document size that these input files represent.

15. Appendix 4 - Public Presentation

Argentia Access Road Indoor Industrial Composting Facility

Environmental Assessment

Environmental Preview Report – Addendum 2

January 2018

Information Session

Proponent:

Metro Environmental Services Ltd.

Heart's Desire, NL

Terrence Penney

Engineering Consultant

Innovative Development & Design Engineers Ltd.

St. John's, NL

Hubert Alacoque, P. Eng. MBA

- Environmental Engineer

Logan R. J. Drum, E.I.T.

- Computer Engineer

Outline

1. Purpose of Study
2. CALMET
3. CALPUFF
4. CALPOST
5. Results
6. Conclusions

1 – Purpose of Study

- Use provincially approved CALPUFF software package to model the odor emissions from the Argentia Access Road Indoor Industrial Composting Facility
- Show scientifically how the odors emitted will quickly disperse into the environment
- Show where odors are detectable in the vicinity of the facility
- Test worst-case scenario to see its impact on the surrounding environment
- Completed necessary requirements as described by the Minister of Municipal Affairs and Environment's Letter

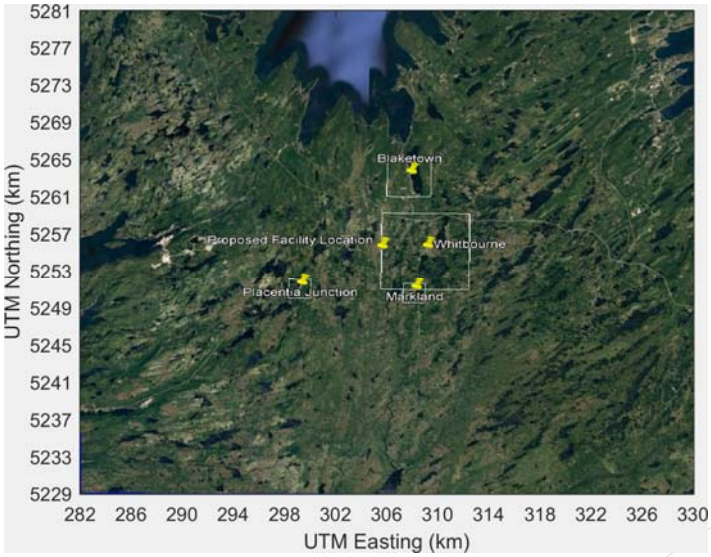
1 – What Is Air Dispersion Modeling?

- Air dispersion modeling is a scientific approach for describing of how different chemicals get diluted into the surrounding environment
- A couple of factors affect the dilution of these chemicals into the environment
  - Extreme elevation changes
  - Land cover/use properties: vegetation, snow, buildings and roads, etc.
  - Meteorological factors: wind, precipitation, temperature, etc.
- The elevation data was obtained from the Government of Canada's Open Data Portal
- The land use/cover data was received directly from the Department of Municipal Affairs and Environment
- Meteorological data was obtained from Lakes Environmental Software

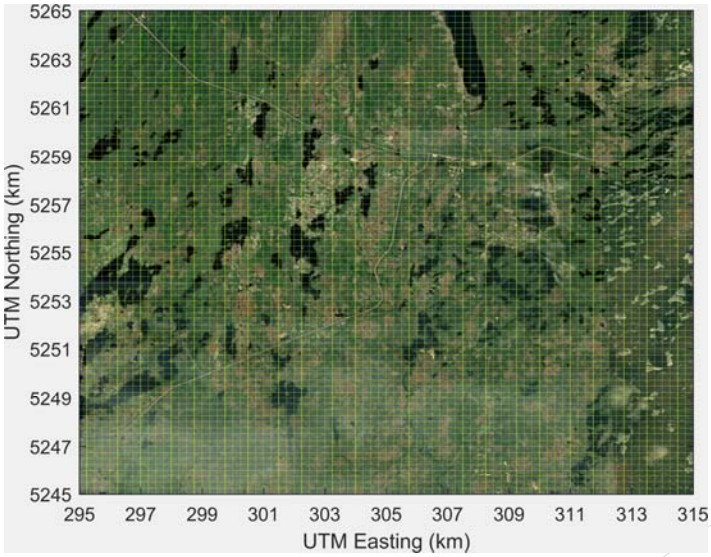
2 – CALMET

- CALMET is a meteorological modelling software that is a part of the CALPUFF modelling system
- CALMET is used to develop hourly wind and temperature fields on a three-dimensional gridded modelling domain

2 – CALMET (Full Data Area)



2 – CALMET (Reduced Area with Grid)



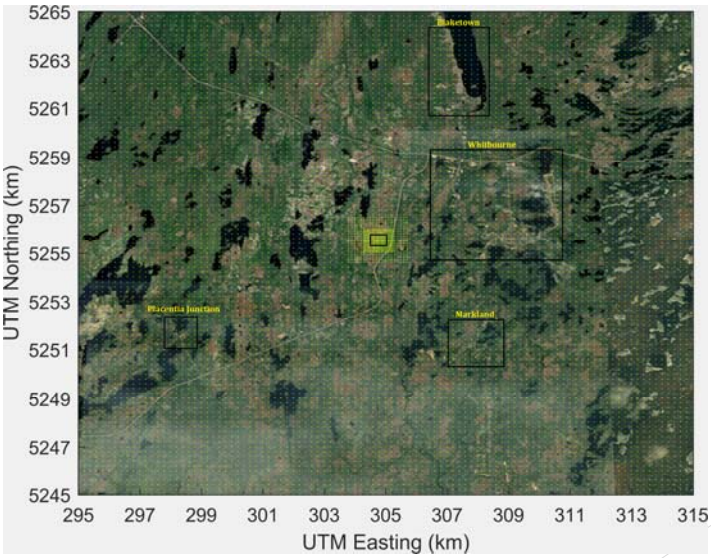
3 – CALPUFF

- CALPUFF is a Gaussian puff dispersion model with chemical removal, wet and dry deposition, complex terrain algorithms, building downwash, plume fumigation, and other effects
- CALPUFF was modelled using an equivalent grid size and grid spacing to that of CALMET

3 – CALPUFF Receptors

- Receptors are generated to measure odor concentrations
  - 50 meter spacing from the center of the operation out to 500 meters;
  - 100 meter spacing from 500 meters out to 1000 meters;
  - 200 meter spacing from 1000 meters out to 2000 meters;
  - 500 meter spacing beyond 2000 meters;
  - 50 meter spacing within all residential areas located less than 1000 meters of the administrative boundary;
  - 100 meter spacing within all residential areas located beyond 1000 meters of the administrative boundary, but located within 2000 meters of the administrative boundary;
  - 200 meter spacing within all residential areas located beyond 2000 meters of the administrative boundary

3 – CALPUFF (Receptor Grid)



3 – CALPUFF Emission Sources

- Two area sources emitting odor
  - 10 m x 34 m
  - 10 m x 40 m

4 – CALPOST

- CALPOST is a post-processing tool used to compile data from the CALPUFF model into an easily readable format
- 1-hour, 3-hour, and 24-hour concentrations are calculated at each receptors

5 – Results: How Is Odour Measured?

- Odour concentration is a dimensionless dilution expressed as either dilution-to-threshold (D/T) or detection threshold (odour units)
- To parameterize this unit, it typically considers an evaporated odourant evaporated into 1 cubic meter (m^3) space
- The threshold of 1 o.u./m^3 is when an odour is perceived by 50% of a panel
- For example, 10,000 o.u./m^3 means it takes 10,000 dilutions to reach the detection threshold for the sampled odour

Odour Concentration

Threshold examples

1 o.u./m^3: Perception threshold

2-3 o.u./m^3: Recognition threshold

5 o.u./m^3 : Discrimination threshold

10 o.u./m^3 : Risk of Complaint

Perfumed person : 20-50 o.u./m^3

Freshly cut grass: 250 o.u./m^3

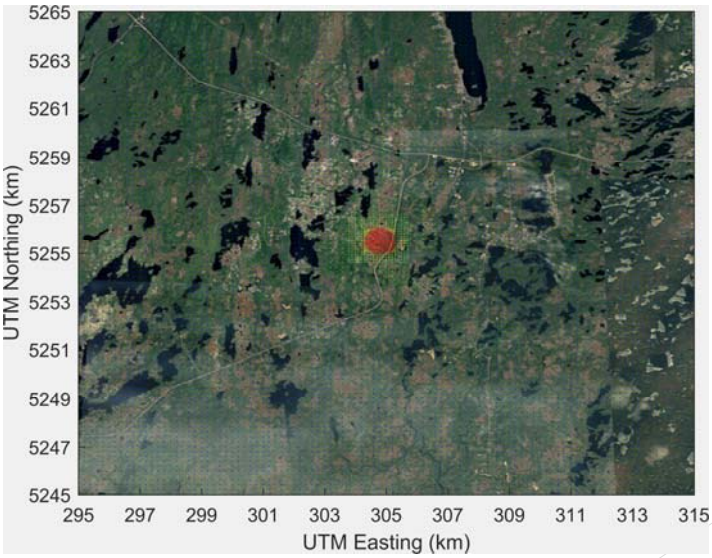
Hold garbage : 500 o.u./m^3

5 – Results: Worst-Case Scenario

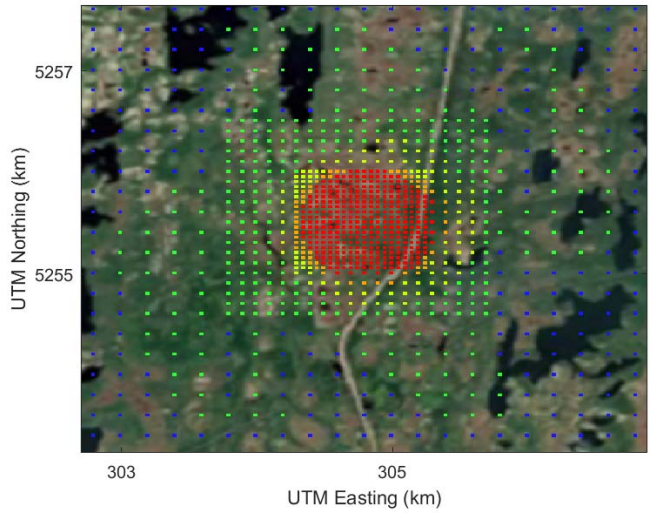
- Biofilter exhaust, which will be used at this facility, has a dilution-to-threshold of 300 o.u.
- Assuming the biofilters are not functioning properly, a greater dilution-to-threshold value of 500 o.u. was chosen
- Both the emission sources will have an output flow rate of 47 m^3/sec, this gives a volumetric flux of odour compounds (rate of volume flow across a unit area) of 23,500 o.u.*m^3/sec (For reference, at 300 o.u. the volumetric flux is 14,100 o.u.*m^3/sec)
- This describes the flow of the odour through the non-functioning biofilter, and shows nearly a doubling in the amount of odour that is getting emitted by the emission sources.

Odor Index Values	Log Value	Odor Units or D/T	Example of Odor Source or Odor Situation
60.0	6.00	1,000,000	Rendering plant uncontrolled exhaust
50.0	5.00	100,000	Venting anaerobic digester gases
40.0	4.00	10,000	Sludge centrifuge vent
30.0	3.00	1,000	Primary clarifier weir cover exhaust
27.0	2.70	500	Dewatering building exhaust
24.8	2.48	300	Biofilter exhaust
20.0	2.00	100	Multistage scrubber exhaust
17.0	1.70	50	Carbon filter exhaust
14.8	1.48	30	Ambient odor adjacent to biosolids land application
11.8	1.18	15	Ambient odor adjacent to aeration basin
10.0	1.00	10	Design value sometimes used in odor modeling
8.5	0.85	7	Ambient odor level sometimes considered a nuisance
7.0	0.70	5	Design value sometimes used in odor modeling
6.0	0.60	4	Ambient odor level common is a city
3.0	0.30	2	Ambient odor level usually considered "just noticeable"
0	0.00	1	Ambient air in a community with "no odor" noticeable

5 – Results (Odor Dispersion Concentrations)



5 – Results (Zoomed In)



5 – Results (Image Color Code)

- Highest concentrations of odors at each receptor color-coded
  - Blue – 0 o.u./m^3
  - Green – 0-1 o.u./m^3
  - Yellow – 1-5 o.u./m^3
  - Orange – 5-10 o.u./m^3
  - Red – 10+ o.u./m^3

6 – Conclusions

- Based on the model that was created, and visually depicted in the last two slides, it can be shown that the odour from this compost facility will have no impact beyond the site
- There were 0 odour concentration detected at all receptors within any of the nearby communities, including Blaketown, Markland, Placentia Junction, and Whitbourne.

Argentia Access Road Indoor Industrial Composting Facility

Questions … ?

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