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Determining Emissions From Landfills And Creating Odor Buffer Distances

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DETERMINING
EMISSIONS FROM LANDFILLS AND
CREATING ODOR BUFFER DISTANCES

by

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ABSTRACT

With population growing every year, more and more people are looking for places to live. This can lead to construction of houses near and around landfills. As homes get closer to landfills, the odors these landfills produce become more of a problem, and lead to an increase in odor complaints. Modeling these odors and recommending odor buffer distances will help determine limits on how close to landfills new homes should be allowed. This should help reduce future odor complaints.

To solve this problem one must accurately estimate odorous gas emissions from the landfill. Often odors can be indicated by methane emissions. A new technique using hundreds of ambient VOC concentrations, which are taken from landfills on a quarterly basis, was used to invert and solve the Gaussian dispersion equation for methane emissions. In this technique, Voronoi diagram theory was used to automatically locate numerous point sources for optimal positioning relative to receptors. The newly solved methane emission rates can now be input into a dispersion model, and the resulting methane concentrations used as surrogates for odors around the landfill.

One of the most important steps in the analysis is to determine which model is best to use for odor modeling. There are many considerations that go into this decision, such as how much time it takes to run the model, how accurate the model is, and how easy the model is to use. Two current models CALPUFF and AERMOD were compared. In the modeling, methane was used as a surrogate for the odors. Since landfills handle many different combinations of waste, the type of odor may vary from landfill to landfill. In this test case, H_2S was assumed to be the main

contributor to the odor emitted from the landfill, and the H_2S-to-methane ratio was used to estimate downwind H_2S concentrations from the modeled methane concentrations.

Once an air dispersion model is selected, it can be used to model odors and to develop a graphical screening method to show where these odors are most likely to occur and how strong they will be. This can be used to determine how close to a landfill homes can be built without having significant odor impacts bothering these new residents. Also, this tool can be used for improving landfill gas management. Several example scenarios include the possibility of not enough soil cover placed on the waste, leaks from an aging collection system, or cracks in the collection piping created by the settling of waste.

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Lastly but most importantly I would like to thank my parents, Nicholas P. and Jean Guarriello, for bringing me into this world and supporting me in every way possible. Without them I would not be the man I am today.

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CHAPTER 1: INTRODUCTION

The research that is presented in this thesis is a continuation of a three-year project that was undertaken to use the latest dispersion modeling to predict odors near landfills and to help recommend odor buffer distances around landfills. The objectives of this three-year project were split into the three major objectives, one per year: "Year 1) The development a modeling methodology for using AERMOD and CALPUFF to predict odors and appropriate odor buffer distances around landfills, and demonstrate the modeling methodology for one selected landfill in Florida; Year 2) The comparison of AERMOD results to CALPUFF results, to determine which model is better suited for the odor buffer study; and Year 3) The development of a simplified modeling tool for use by solid waste managers." [5]

This thesis is a continuation and revision of this three year project started by Veronica Figueroa. Revisions to the method used to measure methane emissions, an addition of a sensitivity study of this method, a comparison of CALPUFF and AERMOD, and the development of a modeling tool to show the odors around landfills are all described in this thesis.

Data used in this project came from the Seminole County Landfill. The Seminole County Landfill is a Class 1 municipal solid waste landfill located in the middle of 6000 acres of land and has three phases. Phase 1 is closed, capped, and is 131 feet high. Phase 2 is the active part of the landfill and is currently 73 feet high. Phase 3 is between phases 1 and 2, it will be 270 feet high. All three phases make up 232 acres of the disposal area and only 127 acres of this have been used. This landfill serves over 300,000 residents and receives approximately 810 tons per day of different types of municipal solid waste. The landfill has a gas recovery system, and until recently, they simply burned off the landfill gas. On May 8, 2008 the landfill opened a landfill gas to energy power plant, which will produce electricity to power more than 6,000 homes every year and is expected to operate for more than 40 years. Figure 1 is an aerial photograph of Seminole County Landfill showing the three phases of the landfill.

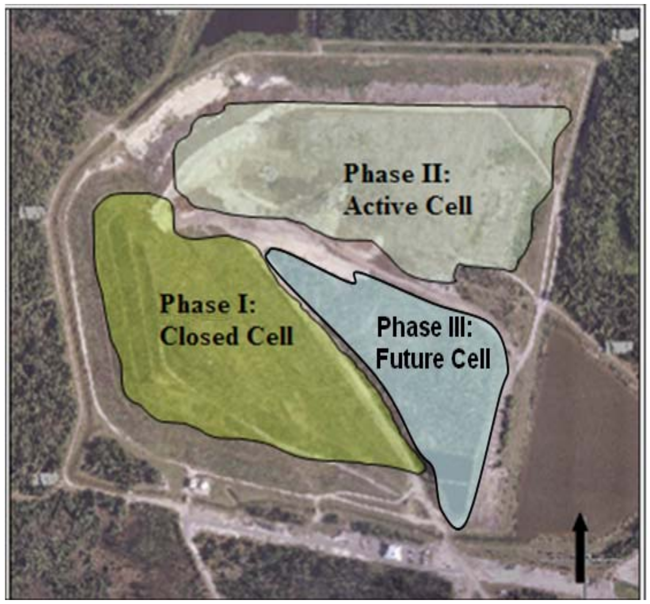


Figure 1: Three Phases of the Seminole County Landfill

This landfill like most others around the United States creates what is known as landfill gas. This gas (commonly known as biogas) is the gas that is produced when organic matter biologically breaks down in the absence of oxygen. In landfills this gas is mostly comprised of methane (CH_4) 45-60%, carbon dioxide (CO_2) 40-60%, and a large number of trace chemical species.[2] Methane is also a key contributor to global warming and when comparing it to carbon dioxide it is 25 times more potent as a greenhouse gas than carbon dioxide. [3] That is why it is so important to know how much methane is emitted even if the source is emitting more carbon dioxide. As seen in Table 1, landfills are still the largest contributor of methane in the U.S., and are projected to continue to be the largest contributor of methane in the future.

Table 1: U.S. Baseline Methane Emissions, MMTCE[4]

Sectors	1990 (hist.)	1995 (hist.)	2000 (prelim. est.)	2005 (proj.)	2010 (proj.)	2015 (proj.)	2020 (proj.)
Landfills	59.3	60.8	56.9	55.5	55.1	52.0	47.6
Coal Mines	24.0	20.3	21.2	22.3	22.4	22.2	21.3
Natural Gas	33.1	33.9	35.8	36.5	37.4	38.5	39.8
Manure Management	7.2	8.5	9.4	9.9	10.5	11.2	11.7
Enteric Fermentation	35.3	37.2	35.1	35.5	36.0	36.5	37.0
Other*	17.0	16.7	16.6	16.4	16.2	16.5	16.9
Total	175.8	177.4	175.0	176.2	177.6	177.0	174.2

* - "Other" sources include fossil fuel combustion, oil production, industrial processes, wastewater treatment, rice production, and biomass burning.

The most recent collection of data showing a detailed breakdown of U.S. sources of methane clearly shows in Figure 2 just how much landfills outweigh other sources when it comes to emitting methane.

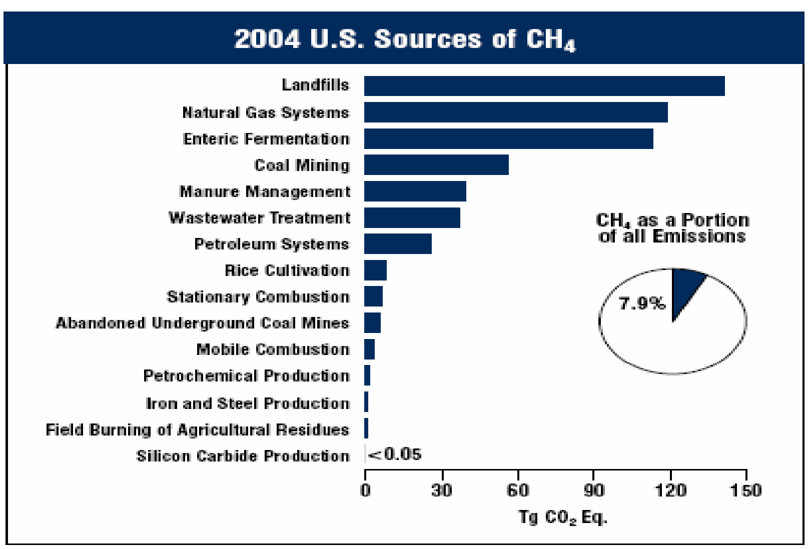


Figure 2: **2004 U.S. Sources of Methane[4]**

Methane is not what causes the odors that people smell around landfills, even though it can be used as a surrogate when it comes to modeling odors. The gas that is the most common source of odors around landfills is hydrogen sulfide (H_2S), but there are many other odorous gases as shown in Table 2 below.[5]

Table 2: Ranking of Odorous Trace Chemical Species[5]

Odor Rank	Trace Chemical Species
1	Hydrogen sulfide
2	Methanethiol
3	Butanoic acid
4	Ethanal
5	Carbon disulfide
6	Ethyl butanoate
7	1-propanethiol
8	Dimethyl disulfide
9	Ethanethiol
10	1-pentene

The reason hydrogen sulfide ranks so high is its detection limit is so low compared to some of these other trace chemicals that can also cause odors. That does not mean hydrogen sulfide is always going to be the leading source of odors, it is also a function of the emission rate of each of these chemical species. According to the Agency for Toxic Substances and Disease Registry which is part of the Department of Health and Human Services, hydrogen sulfide smells like rotten eggs and has an odor threshold of 0.5-1 ppb.[6] Landfills in Massachusetts actually have minimum response action levels of exceedances of hydrogen sulfide where they have to go out and fix the problem if there is an exceedance. The minimum response actions are based upon either exceeding 15 ppb averaged over an 8 hour period or 30 ppb averaged over a 1 hour period.[7] The actions if one of these limits is exceeded are as follows[7]:

1. Log the detection of any exceedances and contact local health officials and the Department within 4 hours for exceedances of the H_2S Action Level.

2. Investigate and determine the source and extent of the exceedance following the protocols in the appendices. If possible, correct the problem immediately. Implement corrective actions, if necessary, including:

   1) Cease acceptance of any material that has the potential to contribute to hydrogen sulfide emissions, on at least a temporary basis.

   2) Place additional daily and intermediate cover soils or apply other cover technologies to reduce hydrogen sulfide emissions to ambient air.

3. Implement 24-hour continuous air monitoring for hydrogen sulfide in ambient air, and daily near surface monitoring on the landfill. Conduct additional ambient air monitoring off-site or evaluate need for additional off-site monitoring.

4. In addition, the following actions may be required if directed by MassDEP

   1) Install a passive landfill gas control system (passive vents) that can be retrofitted to become an active gas collection and control system (combustion and/or non-combustion technologies).

   2) Install an active landfill gas control system with landfill gas treatment (combustion and/or non-combustion technologies).

   3) Evaluate the need for the installation of a final cover system with an active landfill gas control system on an expedited schedule. Implement a Community Communications Plan, providing notification to the community and local medical/emergency response personnel that hydrogen sulfide concentrations, if they were to migrate off-site, may create an odor nuisance condition.

5. Conduct additional ambient air monitoring off-site to determine the hydrogen sulfide concentration at receptor locations.

Modeling the dispersion of these odorous compounds is done to predict downwind concentrations as a function of distance from a landfill. If detectable and annoying, odors will cause a complaint. It will vary from landfill to landfill, but there are certain parameters that will influence when and how far from the landfill odors will be detected. Parameters include time of day, wind speed, wind direction, temperature, emission rate, local topography, and ones personal sense of an odor. Every person may have a different point at which they will be able to detect an odor and another point at which that odor becomes a nuisance. The time factor of odors is on the order of minutes if not seconds and this also will vary from person to person. These topics of odors are discussed in more detail in the literature review.

It is required for landfills that have the potential to emit more than 50Mg/year of non-methane volatile organic compounds (NMVOCs) to collect and combust their gas (or, with new technologies, to collect and use the gas to produce energy), under 40 CFR Part 60, Subparts WWW of the 1996 EPA New Source Performance Standards and Emission Guidelines for Municipal Solid Waste Landfills. Flaring or converting the landfill biogas to energy will help reduce emissions of odors and other compounds. To make sure these collection systems are running properly, it is required that the landfill do quarterly surface VOC monitoring. An exceedance of 500 ppm above background is a violation of these regulations and will require additional action.

In this study three different sets of this data were used. Appendix A shows the results of the Seminole County Landfill’s Fourth Quarter 2006, Second Quarter 2007, and Second Quarter 2008 Surface Emissions Monitoring Report. The Second Quarter 2008 actually shows an example of an exceedance of 500 ppm and how it was required to come back at a later date to recheck that area. One of the big accomplishments of this research was using the quarterly surface VOC measurements to solve for not only the total methane emissions from the landfill, but also to resolve the approximate locations of large emissions from within the landfill. Also included in Appendix A with the reports are figures from each of the quarter's surface emissions walking surveys. These figures show where the field service surveyor started recording the methane measurements and where they ended. The surveyor periodically wrote down the number of the last point he took if there was an exceedance or the surveyor changed directions. Lines were drawn on the plot plan of the route the surveyor took, and using the numbers of the points the surveyor wrote down on the figure it was possible to place each of the points taken as receptors and find their coordinates. This way the receptors can be used to estimate the methane emissions that are discussed in the study.

CHAPTER 2: LITERATURE REVIEW

The goal of this research was to ultimately produce a way to determine odor buffer distances for any particular landfill. There are many ways people have tried to measure or predict odors around different landfills. Since odors can be a nuisance to the people who live around landfills it is important to accurately determine the distance where these odors will first become a problem. There are three main things that lead up to this goal and need to be understood to predict odor buffer distances.

The first of these three main focus points is to understand the fundamental nature of odors, how they are perceived by people, and the different ways they are measured. The next main topic is how odors vary from landfill to landfill. The most common cause of odor from a landfill is H_2S, but in any given landfill, a different compound or group of compounds might be the cause of odors. It is often helpful to determine a ratio of specific odor to methane so that the ultimate goal of accurately determining the odor buffer distance can be achieved. With the ratio of specific odor to methane, one can apply it to the methane concentrations around the landfill and determine the odorous concentrations. The last point that must be discussed is which air dispersion model should be used to model odors. The three models that were compared in this thesis are CALPUFF, AERMOD, and ISC. Each has its benefits, but one model must be chosen, based on accuracy, efficiency, and suitability for modeling odors.

All these topics have been researched by numerous investigators in the past. This author read a number of papers to gather information that was used in this research. The main points of this literature are summarized and presented in the following pages, organized by topic.

The Nature of Odors

An odor can be described as either pleasant or unpleasant, and odors from a landfill fall under the unpleasant category. The actual smell of an odor gives very little information on the compounds in that odor, since there are various compounds that can be mixed together that cause the odor from any landfill as was seen in Table 2. Sulfides and ammonia are the most common odor causing sources in a landfill, but sulfides can cause the strongest of smells since humans can detect them at very low concentrations. Odors are highly unlikely to cause any major health effects, but have been known to cause eye irritations and headaches at high concentrations. It depends on the individual, since every person reacts differently to certain odors. So trying to determine how much odor is coming from a landfill and where it is going can be a very difficult task since wastes have these vastly different chemical compositions.

There are various methods for measuring odorous compounds, each with their advantages and disadvantages. Some examples of these methods are electronic noses (sensor arrays), dynamic dilution olfactometry (using a human panel), using an odor index, and gas chromatographic analysis. A methodology similar to that used in this research is discussed in a study by Tagaris et al. (2003). In that study, CH_4, even though an odorless gas, was used as an index to determine the dispersion of low-reactivity odorous species around a landfill site.[8] The study used a different method to determine the methane emissions, but did use methane as a surrogate to the odorous chemical species and then used an air dispersion model to track the odors.

Electronic noses contain an array of sensors (sintered metal oxides, catalytic metals, conducting polymers, lipid layers, phtholocyanins, organic semi-conductors, surface acoustic wave or combinations) which respond to a wide variety of chemical classes. The sensors are based on conducting composites where electrical resistance will change on exposure to a particular vapor. [9] Based on this change in resistance the sensors can identify the type and quantity of the odor. An advantage of the electronic nose is that it can measure a complex group of substances very rapidly. Some disadvantages are it must be standardized by both chemical and olfactometric methods and one of the biggest challenges is detecting complex odors against an intricate background matrix. [9]

Dynamic dilution olfactometry is a way to measure odors that uses humans as the sensors. The most common term used in this method is “odor threshold” or the lowest concentration that can be detected by 50% of the population. The problem with this though is determining the detection of unknown complex mixtures, such as what might be in the air that is around a landfill. A way around this problem is to express the odor strength as a number of odor units, which is a calculated value based on the threshold dilution ratio (human panel). [9] Odor units are commonly used around the U.S. as a way to measure odor emissions, but also have their disadvantages. The main problems with using the odor unit as a standard are the variability of people who serve as the panel that determines the odor units, and the odor unit method includes no measure of importance of the odor. [9] This variability of people who serve as the detectors can be seen in Figure 3. Every person has a different threshold value to where they can detect the odor and another different value for when that odor becomes a nuisance to them.

Judge	Dilutions							
	Dilution Factors (concentrations increase →)							
	8	7	6	5	4	3	2	1
	256	128	64	32	16	8	4	2
1	0	0	0	+	+	+	+	+
2	+	0	+	0	+	+	+	+
3	0	+	0	0	0	+	+	+
4	0	0	0	+	+	+	+	+
5	0	0	0	0	0	0	+	+
6	0	0	+	+	+	+	+	+

"0" indicated that judge selected the wrong sample from a set of three
"+" indicates that judge selected the correct (different) sample

Figure 3: **Calculation of Odor Threshold (Determined by Olfactometry)**[9]

The application of gas chromatography has also been widely used as another way to measure odors. The way this application works is compounds based on their vapor pressures and polarities are separated from the total mixture of the volatile substance. The compounds are then detected as peaks which have specific retention times and peak areas which can be used for qualitative and quantitative determinations, respectively. [9] The major advantage of gas chromatography is that it can separate the different compounds from the air as seen in Figure 4 and determine what type of compounds they are. The major disadvantages include having to extract the air into an adsorbent trap, moisture problems with these traps, and how expensive it is to do this entire process.

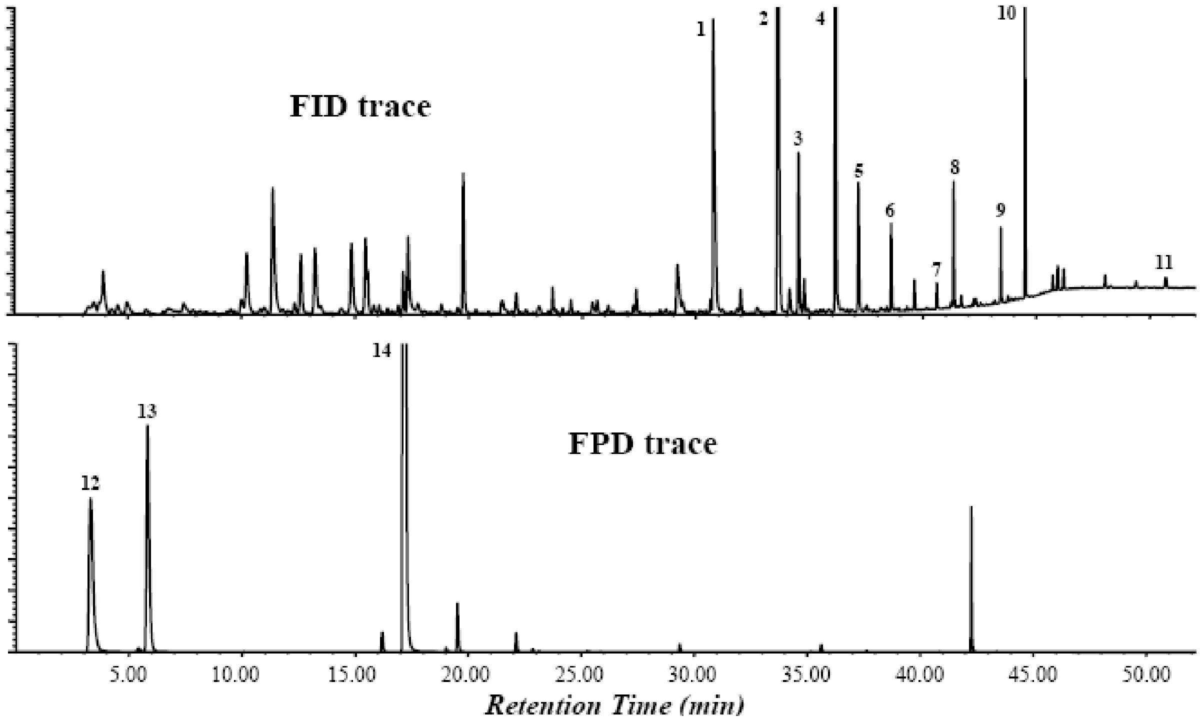


Figure 1. Gas chromatograms of air-borne volatile organic compounds collected via a Tedlar™ bag from air emitted from a swine finishing building; FID trace = flame ionization detector, FPD trace = flame photometric detector. (**1** = acetic acid, **2** = N,N-dimethylacetamide {artifact from Tedlar™ bag}, **3** = 2-methylpropanoic acid, **4** = butanoic acid, **5** = 2-/3-methylbutanoic acid; **6** = pentanoic acid, **7** = hexanoic acid, **8** = heptanoic acid, **9** = phenol, **10** = 4-methylphenol {*p*-cresol}, **11** = indole, **12** = methanethiol, **13** = dimethylsulfide, **14** = dimethyldisufide). [***Purge and Trap-Thermal Desorption-GC.*** VOCs were collected on 1/4 in. glass Carbotrap 300 multi-bed adsorbent tubes (Supelco, Bellefonte, PA) by drawing air through trap at a rate of 100 mL/min using a vacuum pump for 20 min.

Figure 4: **Gas Chromatography Example**[9]

Estimating Methane Emissions

This research relied heavily on estimating methane emissions to use as surrogates for odors and there are three main reasons why.

1) Methane represents 40-60% of total emissions from a landfill.
2) The VOC measurements taken every quarter are given as methane (ppm).
3) Methane has a far lower background concentration than carbon dioxide.

There are many ways of estimating methane emissions, each with their advantages and disadvantages just like measuring odors. Some of the ways to estimate methane emissions are using flux chambers, biogas production models, optical remote sensing methods, and the method discussed in this thesis using the Gaussian dispersion equation.

The flux chamber has been a popular method used to measure methane emissions from landfills in many studies. There are two ways a flux chamber can be used to measure emissions either the static/closed flux chamber method or the dynamic/open flux chamber method. The closed flux chamber is the most popular since it is the simple and cheaper to use, but people have discovered errors in its calculations. The major advantage is the closed flux chamber is not being continually diluted with external air so even small fluxes can be measured. The main drawback of the closed chamber technique is as the gas accumulates in the chamber the increase in concentration decreases the flux rate, so the technique underestimates the gas fluxes.[10] The main drawback of the open container is the exact opposite of the closed chamber, it overestimates fluxes due to pressure changes in the flux chamber. Not only will results vary depending on which chamber is used, but other problems that arise with flux chambers are how much time and labor it takes to get one point measurement.

The second method to calculate methane emissions are from biogas production models. The most commonly used biogas production model used is the Landfill Gas Emissions Model (LandGEM) developed by Environmental Protection Agency (EPA). LandGEM is an automated estimation tool with a Microsoft Excel interface that can be used to estimate emission rates for total landfill gas, methane, carbon dioxide, nonmethane organic compounds, and individual air pollutants from municipal solid waste landfills. [11]

$$Q_{CH_4} = \sum_{i=1}^{n} \sum_{j=0.1}^{1} kL_o \left(\frac{M_i}{10} \right) e^{-kt_{ij}}$$

Where:
Q_{CH4} = annual methane generation in the year of the calculation (m^3/year)
i = 1 year time increment
n = (year of the calculation) - (initial year of waste acceptance)
j = 0.1 year time increment
k = methane generation rate ($year^{-1}$)
L_o = potential methane generation capacity (m^3/Mg)
M_i = mass of waste accepted in the i^{th} year (Mg)
t_{ij} = age of the j^{th} section of waste mass M_i accepted in the i^{th} year (decimal years, e.g., 3.2 years)

Figure 5: **First-Order Decomposition Rate Equation**[11]

This gas generation model relies heavily on these variables and the assumptions made for variables. Even though this tool is relatively easy to use, the problems that arise with it are that the assumptions will influence the accuracy of the model, and the model is not accounting for how much methane is being emitted versus captured.

Another way methane emissions can be measured is using an optical remote sensing method. The optical remote sensing method uses open-path Fourier transform infrared (OP-FTIR) spectroscopy to obtain path-integrated pollution concentration information along multiple plane-configured optical paths.[12] This method has several advantages that some of the other methods previously mentioned don't have. The measurement of gases is the path-average concentration of each compound within the defined path and it would take many samples along that path for a traditional point sampling method to provide the same data.[13] There is no collecting of samples required and sending them back to the lab, which has been a source of errors for other methods. The major disadvantages with this method are the cost, labor to set up, time, and the variability of wind orientation.

Introducing CALPUFF, AERMOD, and ISC

The three most widely used air dispersion models are CALPUFF, AERMOD, and ISC. CALPUFF is a Lagrangian puff model that can predict air quality concentrations over a range of averaging periods and EPA currently approves the CALPUFF model for use for long-range transport of pollutants.[14] AERMOD is a Gaussian plume model that is replacing ISC and is used for short-range transport of pollutants. ISC is similar to AERMOD in that it is also a Gaussian plume model, but is far less advanced and has fewer model options. Also, ISC handles terrain, calm winds, and meteorology differently then AERMOD. There are many studies done comparing these models for all types of pollutants, but not necessarily for odors. That is why it was important to compare each model to see what changes in the models will affect modeling odors.

Starting with a comparison of AERMOD and ISC, a sensitivity study between the two models and their inputs indicates which model is better for modeling odors. Differences found during sensitivity studies between the two models, that might affect modeling odors, are that ISC surface roughness can only be specified as rural or urban, the values in AERMOD can be specified precisely. The mixing heights are calculated by AERMET in AERMOD, but must be specified by the user in ISC.[15] The main difference that affects odor concentrations and showed that ISC was not the best choice for modeling odors is how ISC handled winds. Maximum concentrations predicted by AERMOD and ISC correlated well when wind speeds exceeded 5 m/sec but diverged rapidly as wind speeds decreased.[15] This is caused by the fact that AERMOD includes the effect of plume meander at low wind speeds while ISC does not.

When comparing CALPUFF and AERMOD, each had their advantages and disadvantages. CALPUFF can be used on distances from tens of meters from a source to hundreds of kilometers. It includes algorithms such as building downwash, transitional buoyant and momentum plume rise, partial plume penetration, sub-grid scale terrain, coastal interaction effects, and chemical transformation.[14] Even though CALPUFF has these advantages and algorithms, they are perhaps not useful for short range modeling, such as with odors. CALPUFF has its disadvantages including how much longer it takes to run then AERMOD, the increased amount of inputs CALPUFF has that take time to learn, and understanding what each input does. These can be seen in Table 3.

Table 3: AERMOD vs. CALPUFF

AERMOD	CALPUFF
1. Faster run time (on order of minutes).	1. Long run time (on order of hours).
2. Fewer inputs to go through.	2. More inputs to go through that are not necessarily used for modeling odors.
3. Easier to set up an input file and in less time.	3. Longer time to learn model and set up an input file.
4. Model does a better job a pin-pointing where errors are and what they are.	4. Can take awhile to find errors since the model input file is so large and error file can be difficult to decipher.
5. Steady-state plume model	5. Non-steady-state puff dispersion model.
6. Does not track the contribution of plumes from previous hours.	6. Tracks puffs until they have left the modeling domain.
7. Normally used for short range transport of pollutants.	7. Normally used for long range transport of pollutants.

Both CALPUFF and AERMOD have options that can be helpful when modeling, but the model that should be chosen is the one that best models odors. A test case was run for AERMOD and CALPUFF comparing the two models predicted output concentrations to determine which model is the best to use for modeling odors. Both models produced similar outputs for concentrations of odors in the test case, with CALPUFF concentrations being slightly higher. Without measured odor concentration data to compare with the modeled concentration data, it was a hard decision choosing a model just based on this test. That is why using knowledge of odors, the literature review of the models, the advantages and the disadvantages of each model, and the test case of the models, AERMOD was chosen.

CHAPTER 3: METHODOLOGY

Past researchers have used many of the different methods discussed in the literature review of odors trying to determine the concentrations of odors surrounding landfills. This study had a similar approach to the Targaris methodology in that it used methane as an index for odors and used a ratio of trace chemical species to methane to determine the odor concentrations. Using the methodology shown below, establishing odor buffer distances can be done for any landfill in Florida. A further discussion of each step introduced below is provided in the following pages.

The first task is obtaining ambient air methane concentrations and atmospheric conditions for the landfill to be modeled. The methane concentrations can be obtained from one's own sampling or from sampling reports that are made every quarter at many Florida landfills. If not measured on site at the time of sampling, some expertise and judgment must be used in estimating the atmospheric conditions (wind speed, wind direction, and stability class) that were present at the time of sampling. These meteorological parameters are needed to complete the task of estimating methane emissions.

The second task is to estimate methane emissions. This task uses an inverse modeling method that is based on the Gaussian dispersion equation. Rearranging the Gaussian dispersion equation and solving the inverse problem, one can predict emission rates at many point locations within the landfill.

The third task is to derive an odorous gas to methane ratio. For this one can use the methane concentrations recorded in task one and a sample of the odorous gas at this same point to determine an average odorous gas to methane ratio for the landfill being modeled.

The limits for acceptable concentrations of this odorous gas are determined in task four and consist of three “threat levels”. The analogy of a stop light is used for these limits and consists of a green, yellow, and red level. As with a stop light green means go or in this case that it is safe to build, and 99.95% of the time odors will not be detected in this area. The color yellow will represent a proceed with caution zone, where depending on the individuals odor threshold odors may be detected from time to time. The third level of red represents a stop and do not build area where odors will be detected and may become a nuisance. This conservative approach is based on using the 4^{th} highest odor concentrations that are determined by dispersion modeling (task five).

The fifth task is to conduct air dispersion modeling using AERMOD to determine where outside the landfill fence-line these odors are going to occur and at what concentrations. For a years worth of meteorological data the 4^{th} highest concentrations of methane are recorded and used to generate color plots of the odor “threat levels.”

Task six involves using the limits set in task four and 4^{th} highest concentrations modeled in task five. Using the limits of methane concentrations which correspond to the odorous gas concentrations coming from the landfill colored plots can be created and one can see the odor buffer distances from an overhead view of the landfill and surrounding areas. Table 4 is a summary of the methodology described above and was used in this study.

Table 4: Methodology for Establishing Odor Buffer Distances around any Florida Landfill

Task 1	**Obtain Methane Concentrations and Atmospheric Conditions**	Either by sampling or from existing reports obtain methane concentration data and estimate atmospheric conditions (wind speed, wind direction, and stability class).
Task 2	**Estimate Methane Emissions**	Estimate methane emissions using the inverse modeling method.
Task 3	**Derive Odorous Gas to Methane Ratio**	Sample landfill gas to estimate odorous gas content and derive odorous gas/methane ratio.
Task 4	**Set Limits**	Use ratio to calculate projected methane concentration limits corresponding to red, yellow, and green "threat levels". (Note suggested limits for hydrogen sulfide are 1-hour H_2S concentrations of >30 ppb for red, 15-30 ppb for yellow, and any concentrations under 15 ppb for green.)
Task 5	**Conduct Air Dispersion Modeling**	Gather meteorological data and run AERMOD to determine the distances where these maximum concentrations will occur. (Note- 4th highest concentrations represent the 99.95 percentile).
Task 6	**Generate Plots**	Using limits set in task 4 and results from air dispersion modeling generate colored plots establishing odor buffer distances.

Task 1: Obtain Methane Concentrations and Atmospheric Conditions

Since many landfills have to do quarterly surface VOC monitoring, such reports were used to estimate methane emissions. VOC monitoring uses numerous measurements, usually anywhere between 350-450 measurements. Using these reports not only provides a robust amount of methane concentrations in the landfill to use to calculate methane emissions, but also helps ensure that no large methane concentrations are missed. If there is a large methane concentration recorded this could reveal a leak in the biogas collection system or a part of the landfill that has developed a crack in the covering. This would not only reveal where a problem is occurring, but also could be a major source of where odors may be coming from.

There is tremendous amount of data given in every quarterly surface VOC monitoring report that can be used in the task of estimating methane concentrations. Not only does each report give the concentrations of methane at each point recorded in the landfill, but gives the upwind and downwind concentrations outside of the landfill. The upwind concentration can be used as the background concentration of methane and is subtracted from the concentrations recorded before being used to estimate methane emissions.

The data in the VOC monitoring reports can be inspected for exceedances (any measurement of methane over 500 ppm). Of the three quarters of reports used in this research, only one quarter (Second Quarter 2008) had exceedances. In the Second Quarter 2008 there were five exceedances of 1052 ppm, 823 ppm, 774 ppm, 1034 ppm, and 559 ppm.[16] Each one was rechecked to make sure there were no problems with the biogas collection system or some other type of leak. The field service surveyor treats each exceedance the same no matter what the concentration is, just as long as it exceeds 500 ppm. First it is rechecked 6-7 days after the initial exceedance is recorded and then rechecked one month from initial exceedance. Each point at which the exceedance was recorded has to pass both these rechecks, and in the Second Quarter 2008 case, each did.

The next bit of useful data from the quarterly reports is the date and time of each recorded measurement. These were used to help determine the atmospheric conditions at the time of the measurements. It takes about five hours to walk the entire landfill and get between 350-450 measurements. During this time the atmospheric conditions can change, it is best to have fairly constant weather conditions during the walking survey. For this research all three quarters used had relatively constant weather conditions.

Most of the time every quarterly surface VOC monitoring report will come with a NSPS Surface Emissions Monitoring Calibration and Pertinent Data Form. This form is used to retrieve atmospheric conditions that can be used when it comes time to estimate methane emissions. The form has weather observations such as wind speed, wind direction, barometric pressure, air temperature, and other general weather conditions. All these observations are taken by the field service surveyor and are his or her best estimate of the conditions experienced during that time at the landfill.

If the NSPS Surface Emissions Monitoring Calibration and Pertinent Data Form was not attached, there was another way to estimate the atmospheric conditions. The National Weather Service (NWS) archives all the daily measurements of atmospheric conditions recorded at every official NWS data station. There are numerous websites that collect this data and make it available to the public. The website Weather Underground has every atmospheric condition recorded by every hour of the day and sometimes approximately every 10 minutes depending on the weather conditions at the time.[17] Figure 6 below shows examples from the website showing measurements of atmospheric conditions (by hour for the date of the survey) needed to conduct our modeling. It is noted that the walking survey occurred from about 9 a.m. to 3 p.m. for each of the surveys. These atmospheric conditions and the methane concentrations will be used in the next task of estimating methane emissions.

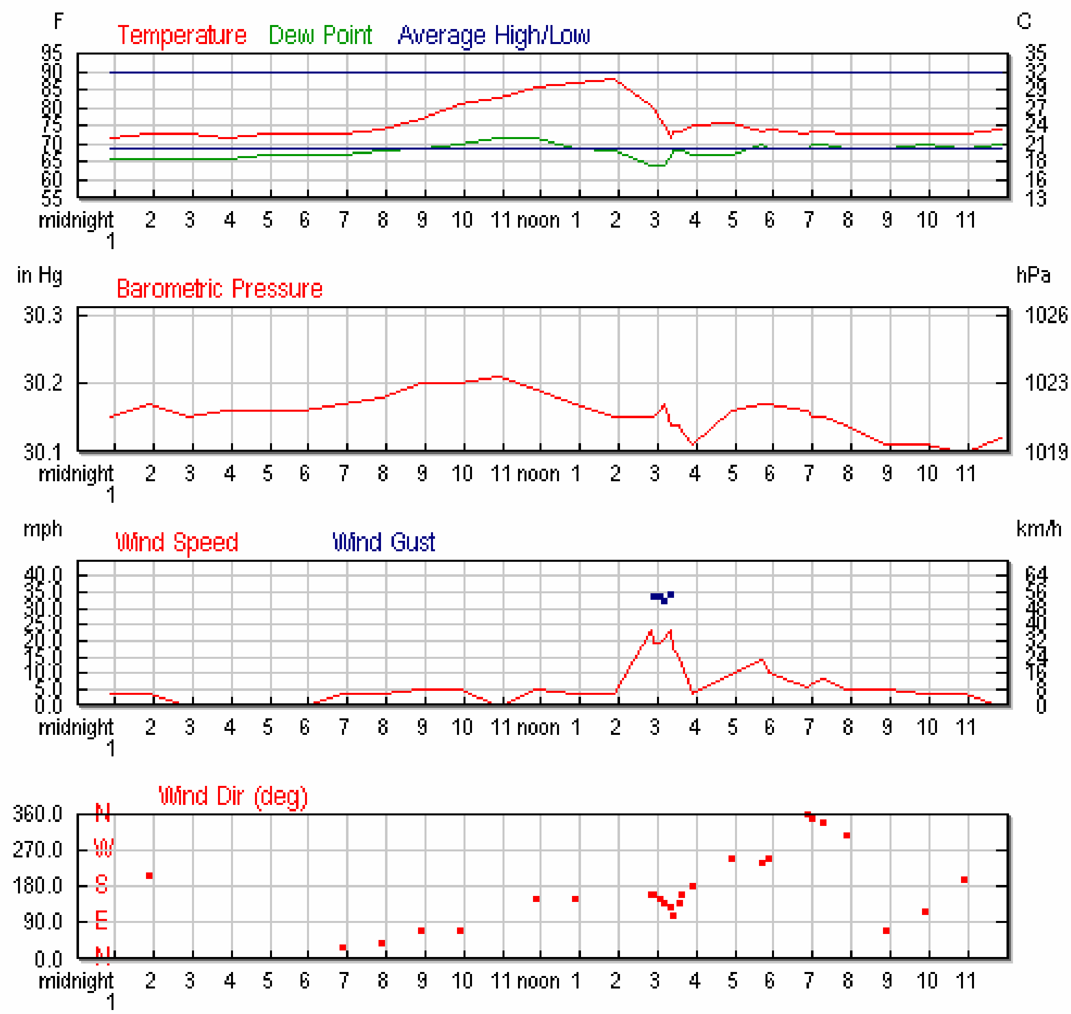


Figure 6: **Atmospheric Conditions for June 26, 2008**[17]

Task 2: Estimate Methane Emissions

There are many ways to estimate methane emissions from landfills. Most of these ways were discussed in the literature review such as flux chambers, biogas production models, and optical remote sensing methods. The method discussed in this thesis is based on the Gaussian dispersion equation, which is shown below as equation (1). This equation (which models the dispersion of a nonreactive gaseous pollutant from an elevated point source) is given here in a form that predicts the steady state concentration (C) in μg/m^3 at a point (x, y, z) located downwind from the source.[18]

$$C = \frac{Q}{2\pi u \sigma_y \sigma_z} \exp\left(-\frac{1}{2}\frac{y^2}{\sigma_y^2}\right)\left\{\exp\left(-\frac{1}{2}\frac{(z-H)^2}{\sigma_z^2}\right) + \exp\left(-\frac{1}{2}\frac{(z+H)^2}{\sigma_z^2}\right)\right\} \tag{1}$$

In this equation Q is the emission rate (μg/s), σ_y and σ_z are the horizontal and vertical spread parameters (m) (σ_y and σ_z are functions of distance, x, and atmospheric stability), u is the average wind speed at stack height (m/s), y is the horizontal distance from the plume centerline (m), z is the vertical distance above the ground (m), and H is the effective stack height ($H = h + \Delta h$, where h=physical stack height and Δh= plume rise, m).

Since methane emissions from landfills are ground-level sources, $z = 0$ and $H = 0$ in equation (1). So equation (1) can be reduced to equation (2) shown below.

$$C = \frac{Q}{\pi u \sigma_y \sigma_z} \exp\left(-\frac{1}{2}\frac{y^2}{\sigma_y^2}\right) \tag{2}$$

The equation (2) can be rearranged as equation (3) to solve for Q the emission rate (for a single source-receptor pair, which will be the methane emission rate needed in this research).

$$Q = \frac{C}{\exp\left(-\frac{1y^2}{2\sigma_y^2}\right)} \pi u \sigma_y \sigma_z \tag{3}$$

The horizontal and vertical spread parameters are given as equations (4) and (5), developed by Martin.[19] The parameters *a*, *b*, *c*, *d*, and *f* are constants that depend on the stability class and on the distance x (x must be expressed in km).[18]

$$\sigma_y = ax^b \qquad \textbf{(4)}$$

$$\sigma_z = cx^d + f \qquad \textbf{(5)}$$

Equation (3) is the form of the Gaussian dispersion equation that is the foundation for the method presented here for estimating landfill methane emissions. This method closely follows the method described in Figueroa's thesis, with a few additions and changes to the method. The changes are described in the following paragraphs, but the basic methodology for the matrix inversions used to solve for methane emissions can be found in Figueroa.[1]

The equations (6) and (7) were used as described in Figueroa's thesis, but methane background concentration was no longer assumed to be zero.

$$C_{i,j} = f(x,y)_{i,j} Q_j \qquad \textbf{(6)}$$

$$C_{i,\text{modeled}} = \sum_{j=1}^{n} C_{i,j} \qquad \textbf{(7)}$$

The upwind methane concentration data from the quarterly surface VOC monitoring report was used as the background concentration and subtracted from each of the recorded methane concentrations ($C_{i,\text{modeled}}$) prior to beginning the solution.

A significant improvement was that the user no longer has to specify (based on judgment and expertise) where to place the sources (Q_j) upwind from the receptors (C_i). Instead point source maximum likelihood locations are predicted using Voronoi diagrams, and importance sampling is performed to further refine locations.[20]

The Voronoi diagram consists of a set of Voronoi regions that can be constructed from a Delaunay tessellation (triangulation) of the existing concentration locations. The vertices of the Voronoi polygons were used to place each source. It is noted that for the case of a landfill, a boundary needs to be set up around the landfill to keep fictitious sources from being created outside the landfill and to prevent the creation of Voronoi polygons with infinite edges. Once the boundary is set the Delaunay triangulation is performed on the receptors inside the landfill, creating a placement of each source relative to the receptors around it. The way each of these sources was placed can be seen in Figure 7 below.

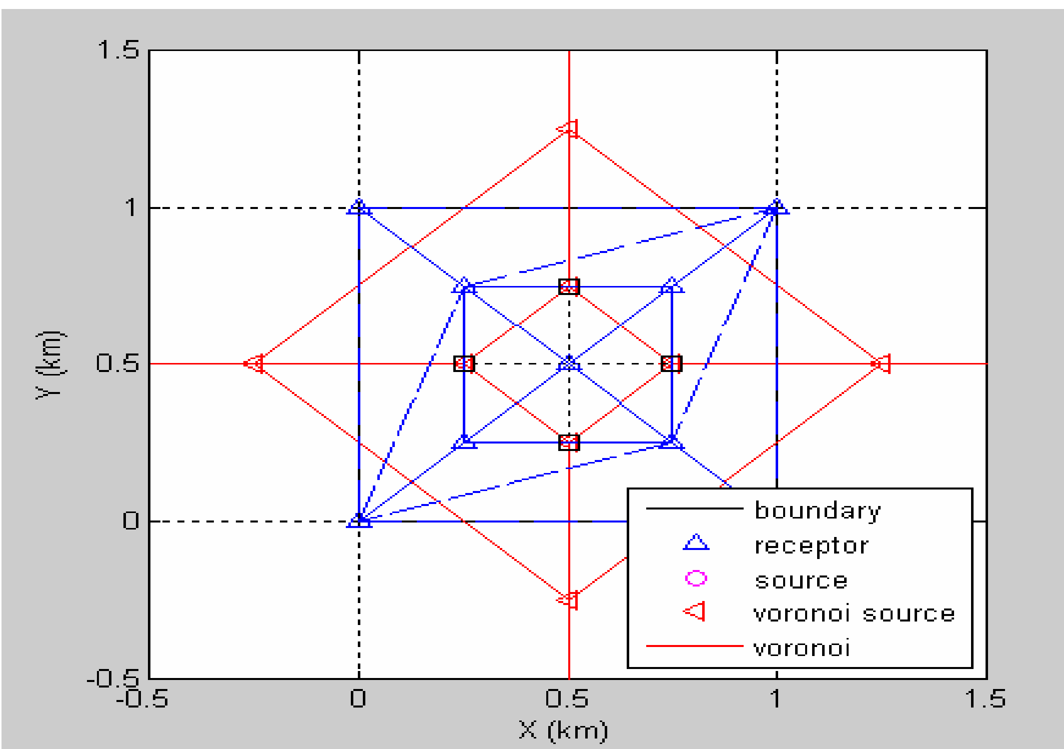


Figure 7: **Example Delaunay Tessellation and Voronoi Regions**[20]

The easiest way to describe how the Delaunay method works is that it forms multiple, non-overlapping triangles by using the three receptors that are closest to each other. For each triangle, the mid point of each line of that triangle was determined and a perpendicular line was drawn from that point. Where three of the perpendicular lines intersected, a point was created and this was considered the source (and a vertex of a corresponding Voronoi polygon). While the sources were being created from the Voronoi diagrams, the sources and receptors were placed to ensure that no source and receptor were within 3m of each other. Once the Voronoi diagram was complete, the sources and the receptors were used to determine the methane emission at each one of the sources.

Importance sampling can also be used to refine the locations and in a paper written by Mackie[20] shows promise in what importance sampling may be able to do in getting the predicted numbers closer to the actual. Importance sampling is used to determine an optimal placement of source locations by sampling within probability density functions with maximum likelihoods located at the Voronoi vertices.

There are two different methods of importance sampling that show the greatest promise. First is the unconstrained simulation, which moves sources ever so slightly, trying to find better placements while ignoring the solution of emissions found in the non-negative least-squares (NNLS) Voronoi method, used in this thesis. Second is the constrained simulation, which uses the total emissions solved for in the NNLS Voronoi method as a basis for moving the sources. The use of importance sampling is something that will be used in the future for this research, but sensitivity studies on the calculated total emissions using the NNLS Voronoi method described in this section need to be analyzed first.

Task 3: Derive Odorous Gas to Methane Ratio

The optimal way to derive the odorous gas to methane ratio would be to sample the landfill gas, estimate the odorous gas content, and then compare it to the methane concentration. That was not possible to do for this research, but would be recommended in further studies. The methodology for determining the odorous gas to methane ratio in this study was done using literature review and doing an average H_2S to methane ratio of similar landfills.

Task 4: Set Limits

The ratio calculated from task 3 was used to determine the projected methane concentration limits. The equation (8) below can be used to do this once a ratio is determined or equation (9) can be used if you have the exact percentage of methane and H_2S in the landfill.

$$Methane\ Limit\ (ppm) = \frac{1}{\left(\frac{H_2S}{CH_4} Ratio \times \frac{1000}{(H_2S\ Limit\ (ppb))}\right)} \quad \textbf{(8)}$$

$$Methane\ Limit\ (ppm) = \frac{\%CH_4}{\%H_2S} \times \frac{(H_2S\ Limit\ (ppb))}{1000} \quad \textbf{(9)}$$

Note suggested limits are 1-hour H_2S concentrations of >30 ppb for red, 15-30 ppb for yellow, and concentrations under 15 ppb for green (more on these limits is discussed in task 6 of the methodology and in the findings section of this thesis under task 4). To better understand this see example 1 below.

Example 1: A landfill contains 53.283 percent by volume methane and 0.002 percent by volume hydrogen sulfide. A contractor wants to build houses near the landfill, but does not want the hydrogen sulfide concentration of 30ppb to be experienced by the people that will move into these houses. What is the maximum concentration of methane that would be allowed?

Answer: Use equation 9→ $\frac{53.283}{0.002} \times \frac{30\,ppb}{1000} = Methane\ Limit\ (ppm) = 799\,ppm$

Using equation (8) the suggested limits for H_2S concentrations of >30 ppb, 15-30 ppb, and under 15 ppb can be used to determine the methane concentration limits of any landfill, if the H_2S to methane ratio is known. This was used to generate the plots for odor buffer distances in task 6.

Task 5: Conduct Air Dispersion Modeling

AERMOD was determined to be best for the air dispersion modeling of odors. AERMOD stands for **A**merican Meteorological Society/**E**nvironmental Protection Agency **R**egulatory **Mod**el and as of December 2006 it replaced ISCST3 as the EPA-preferred regulatory model.[15] The model is intended to be used for transport distances up to 50 km and accounts for complex terrain, flat terrain, elevated sources, surface sources, point sources, area sources, calm winds, planetary boundary effects, and temperature just to name a few.

AERMOD has two pre-processors AERMET and AERMAP, which must be run before AERMOD. AERMET is used as the meteorological processor, and consists of NWS surface data, upper air data, and on-site data. AERMET needs both meteorological inputs and surface characteristic inputs to create a surface and profile file that will be feed into AERMOD.

AERMAP is the terrain processor and produces terrain base elevations for each receptor and source.[21] It needs standardized computer files of terrain data to be able to run, which is available in three formats. The format used in this research was the DEM format (Digital Elevation Model).

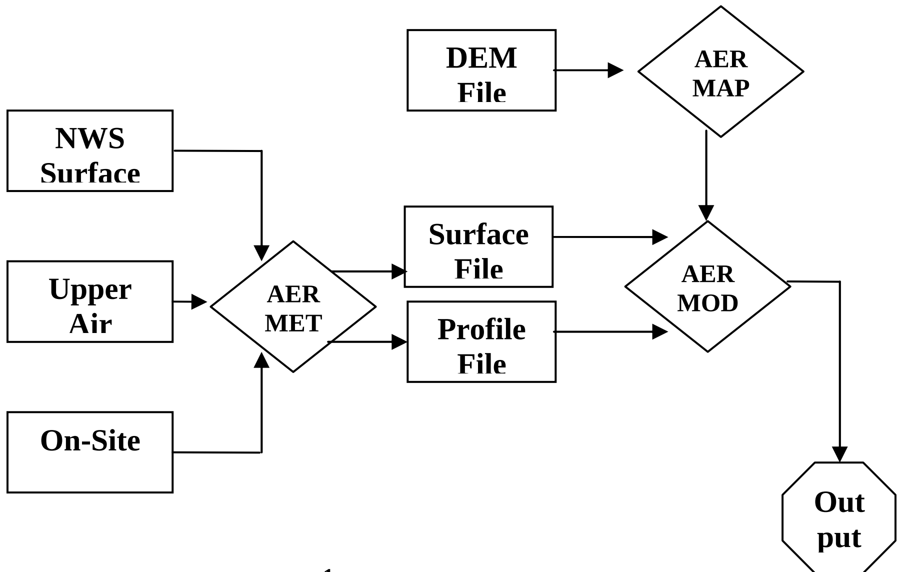


Figure 8: AERMOD Flow Diagram[1]

When both AERMET and AERMAP were run and the source and receptor information was entered, AERMOD was ready to be used. The user then ran AERMOD for a specified time period of meteorological data, which can be anywhere from a certain hour of a year, to a day of a year, or even an entire year. In this case, one entire year's worth of meteorological data was used. The output concentrations from AERMOD were recorded at 300 receptors, and then used in the last task to generate plots of these output concentrations.

The 4^{th} highest ranked concentrations were used to generate the plots. The 4^{th} highest is out of 8760 data points, at each receptor, and thus represent the 99.95^{th} percentile. These were used as a way of being extra conservative in predicting odor buffer distances. Other percentiles could be selected; lower ones would lead to shorter distances.

Task 6: Generate Plots

The limits set in task 4 and results from air dispersion modeling were used in establishing odor buffer distances. As an example, Figure 9 shows how odor buffer distances can be established. (The meanings of the colors are explained below)

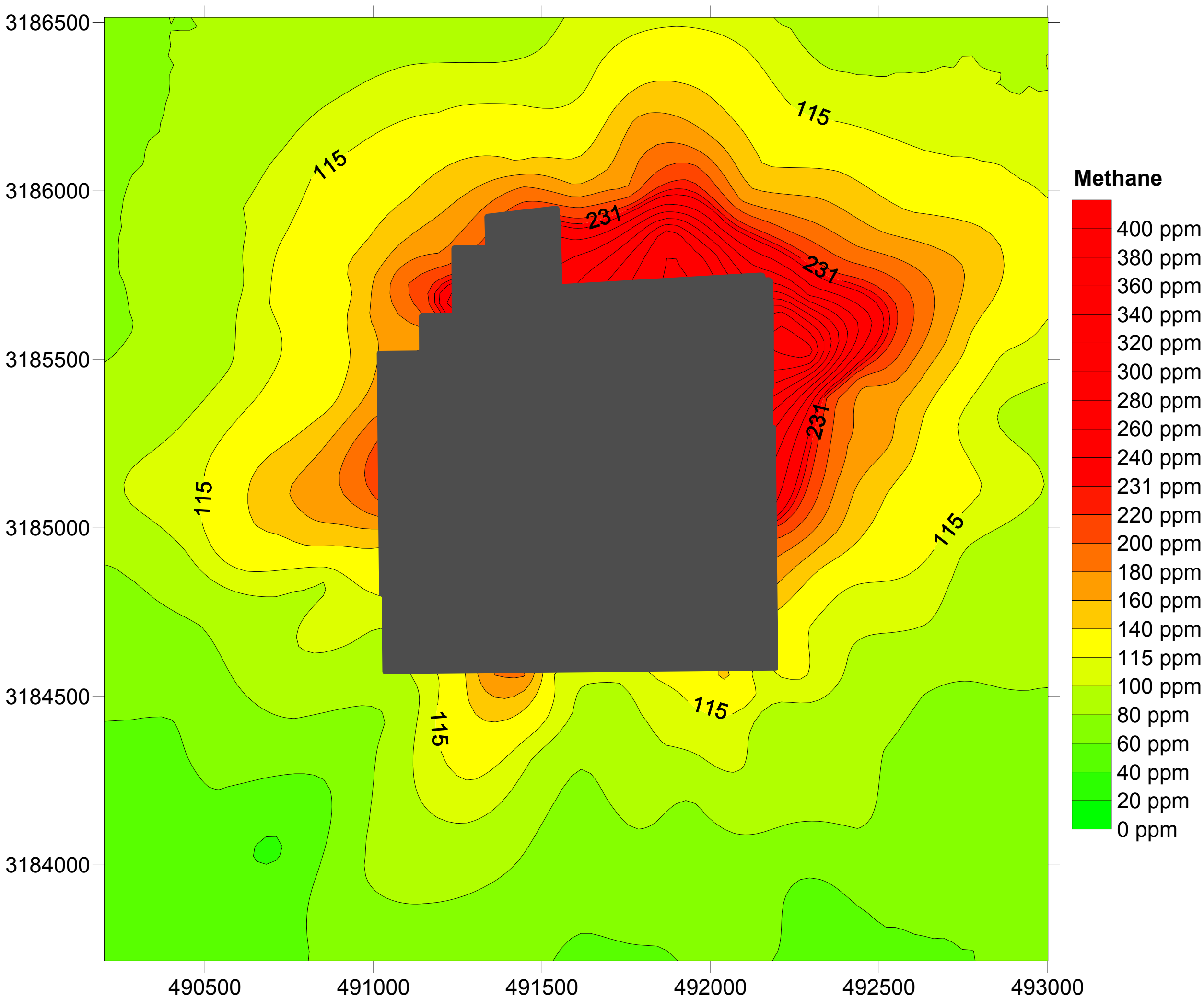


Figure 9: **Example of Odor Buffer Distances**

In the example in Figure 9 the distances (x-y scale of graph is in meters) were set into three different colors of red, yellow, and green. The colors represent suggested areas around the landfill where odors may occur. The color red (stop) corresponds to an area where there is the risk of exceeding 30 ppb H_2S, yellow (proceed with caution) corresponds to odors in the range of

15-30 ppb, and green corresponds to the safe zone (where houses may be built and very rarely will an odor from the landfill ever be a nuisance). This is just an example and the methane concentrations on this figure are just showing what is possible. In specific cases, the methane concentrations correspond to the ratio calculated for that particular landfill and for the meteorology around that landfill.

When this is done for any particular landfill more than one plot should be created since methane emissions will change from quarter to quarter and year to year. Making more than one plot can help in creating more of a certainty of where the odor buffer distances will in fact need to be set to ensure odor complaints are reduced to a minimum. Also running the dispersion model for another year's worth of meteorology and generating a plot is recommended to increase confidence in the odor buffer distances.

CHAPTER 4: FINDINGS

This entire chapter applies the methodology previously discussed to establish odor buffer distances around the Seminole County Landfill (SCL).

Task 1: Estimate Methane Emissions using Three Quarters of SCL data

The three cases of quarterly surface emissions monitoring reports used from the Seminole county landfill consist of 4th Quarter 2006, 2nd Quarter 2007, and 2nd Quarter 2008. Copies of the three reports can be found in Appendix A. Also attached in Appendix A are the NSPS Surface Emissions Monitoring Calibration and Pertinent Data Forms (if one was provided), a history of the weather that occurred on that day, and a figure showing the VOC reading locations.

The quarterly surface emissions monitoring report from 4th Quarter 2006 was taken on December 22, 2006. A total of 425 points were surveyed for VOC concentrations as methane in ppm, using a Landtec SEM 500 flame ionization detector. Based on the NSPS Surface Emissions Monitoring Calibration and Pertinent Data Form, and history from a local weather station, the local wind speed was about 2 mph or 0.89 m/sec, the wind direction was from 130˚ (SE), and the temperature was about 70˚F with mostly clear skies. Based on the information given, the stability class was estimated as class B stability conditions.

The quarterly surface emissions monitoring report from 2nd Quarter 2007 was taken on June 29, 2007. A total of 358 points were surveyed for VOC concentrations as methane in ppm, using a Landtec SEM 500 flame ionization detector. Based on the NSPS Surface Emissions Monitoring Calibration and Pertinent Data Form, and history from a local weather station, the local wind speed was about 3 mph or 1.34 m/sec, the wind direction was from 40˚ (NE), and the temperature was about 88˚F with scattered clouds. Based on information given, the stability class was estimated as class B stability conditions.

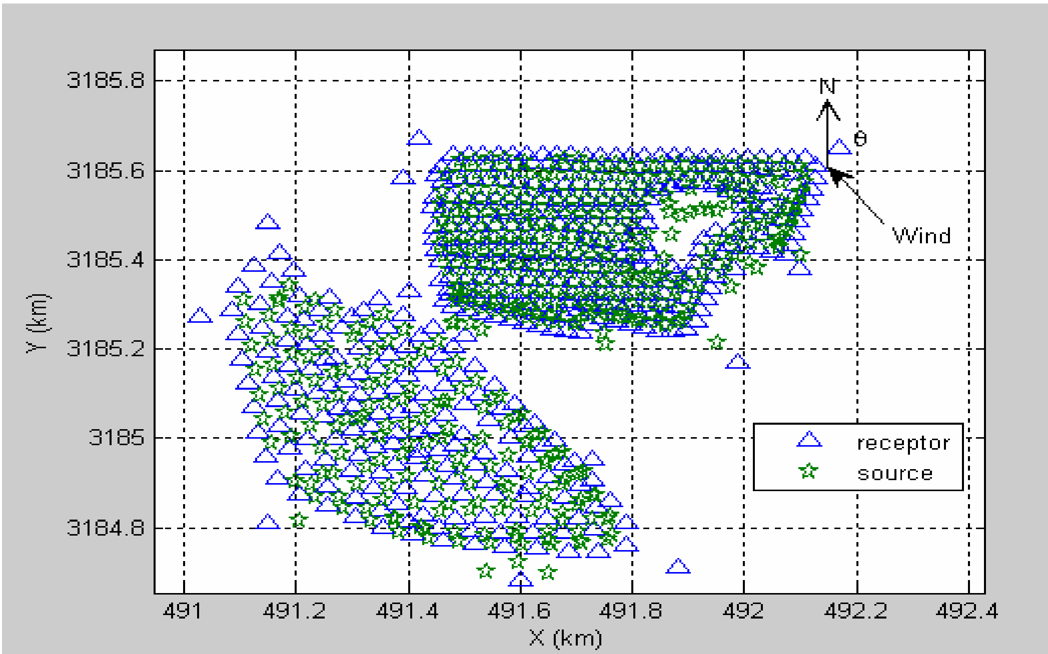


Figure 10: **Placement of the Sources and Receptors**

The quarterly surface emissions monitoring report from 2nd Quarter 2008 was taken on June 26, 2008. A total of 442 points were surveyed for VOC concentrations as methane in ppm, using a Foxboro TVA-1000B flame ionization detector. Based on the history from a local weather station, the local wind speed was about 5 mph or 2.24 m/sec, the wind direction was from 150˚ (SE), and the temperature was about 80˚F with mostly clear skies. Based on the information given, the stability class was estimated as class B stability conditions. The figure above is an example from the 2nd Quarter 2008 data showing where the wind was blowing toward in the upper right corner, the placement of the receptors, and the placement of the sources which was described in task 2.

Task 2: Estimate Methane Emissions

To estimate where the methane emissions are coming from, and how much each source is emitting, the methodology was used as discussed previously. Using the figures showing the VOC reading locations (located in Appendix A) from task 1 for each quarter, an Excel file was set up with each receptor location and the concentration recorded at that location. Each of the three data sets that show how the input concentration files were set up can be found in Appendix B. Once the concentration file was made, the only thing left to do was change the (run_cases.m) file to match the quarter that was about to be run. In this file, the only parameters that were changed were the wind angle, wind speed, and stability class according to the quarter given. Now the inverse modeling method was run through MATLAB to get the source strengths, and the Voronoi diagram technique was used to place the sources. The source locations (in UTM (km) coordinates) and their emissions (in (ug/s)) were sent to an output file called temp.out. This file was put in excel, where emissions were converted to g/s and summed up to give the total emissions of the landfill for that quarter. Each excel sheet set up from the output files are located in Appendix C for each quarter.

Table 5: Background and Summary of Total Emissions for Each Quarter

	2006 4th Quarter Total Emissions	2007 2nd Quarter Total Emissions	2008 2nd Quarter Total Emissions
Wind Angle	130	40	150
Wind Speed (m/s)	0.89	1.34	2.24
Stability Class	B	B	B
Background Concentration	3.1 ppm	2.45 ppm	1.82 ppm
Total Emissions (g/s)	*608.7*	*707.5*	*1233.4*

The results for total emissions based on the three data sets are quite different as seen above in Table 5. There are various reasons as to why there appears to be an increasing trend seen in Table 5 from year 2006-2008, such as the meteorological history (especially recent rains), amount of waste dumped prior to the quarterly survey, type of waste dumped, and possible cracks or leaks occurring with an aging system. Another possibility is that the values of the meteorological parameters were not known accurately when calculating the emissions.

Task 2.1: Sensitivity Study

The Gaussian equation, used to solve for the methane emission rates, relies heavily on meteorological parameters. Variables such as wind speed, the horizontal spread function, the vertical spread function, are based on the meteorology at that given time. It was important to perform a sensitivity study on these parameters to determine how they affect the total emissions being predicted since there is no hourly on-site meteorological data provided at the landfill. For this study, the 2nd quarter 2007 monitoring report was used and the conditions that were estimated at the time of this survey were used as the initial conditions (Table 6). These values were changed one at a time to determine the sensitivity of each variable in the Gaussian equation.

Table 6: **2007 2nd Quarter Initial Conditions Used**

2007 2nd Quarter	
Wind Angle=	40
Wind Speed=	1.34
Stability Class=	B
Background Concentration=	2.45 ppm
Total Emissions (g/s)=	707.5

The sensitivity study was done on these parameters and the results can be seen in Table 7 below. The table shows how much the total emissions of the landfill are affected by each of the parameters especially stability class. The wind speed and wind angle correlate well when comparing percent change from base and percent change in predicted emissions, while stability classes percent change from base and predicted emissions vary from class to class. That is why it is crucial to get precise on-site measurements of meteorology to get accurate predicted emissions.

Table 7: Sensitivity Study of 2007 2nd Quarter Meteorological Conditions

Wind Speed (u) (m/s):	% Change from Base	Total Emissions (g/s)	% Change in Predicted Emissions
1	**-25.4%**	***528.0***	***-25.4%***
1.25	**-6.7%**	***660.0***	***-6.7%***
1.34 (base)	**0.0%**	***707.5***	***0.0%***
1.5	**11.9%**	***791.9***	***11.9%***
2	**49.3%**	***1055.9***	***49.3%***
2.5	**86.6%**	***1319.9***	***86.6%***
Stability Class:			
D	**-33.3%**	***281.3***	***-60.2%***
C	**-16.7%**	***415.1***	***-41.3%***
B (base)	**0.0%**	***707.5***	***0.0%***
A	**16.7%**	***1302.7***	***84.1%***
Theta (θ) (Direction wind from)			
20	**11.11%**	***820.9***	***16.0%***
40 (base)	**0.00%**	***707.5***	***0.0%***
60	**11.11%**	***794.8***	***12.3%***
320	**44.44%**	***978.2***	***38.3%***

Task 3: Derive H_2S to Methane Ratio

The optimal way to derive the H_2S to methane ratio would be to actually sample the H_2S content at various points during the walking survey of the monitoring report, using a portable H_2S analyzer that can measure H_2S to levels as close as 1 ppb. So if both the H_2S and methane concentrations were sampled at various points during the walking survey, a robust sample of the two could be used to provide an accurate H_2S to methane ratio for that particular landfill. The same theory could be applied to any odorous gas at a landfill to derive a useable ratio.

This method was not able to be done for this study, so further research of the literature was done to find reported H_2S-to-methane ratios.

Table 8: H_2S/ CH_4 Ratios from Literature Review

	Hydrogen Sulfide	Methane	H_2S/ CH_4 Ratio
Case 1[22]	63.3 ppm	540000 ppm	0.00012
Case 2[23]	70.0 ppm	500000 ppm	0.00014
Case 3[24]	900 ppm	730000 ppm	0.00123
Case 4[25]	20 ppm	532830 ppm	0.00004
Case 5[8]	10000 ppm	450000 ppm	0.02222
Case 6[27]	247.8 ppm	286000 ppm	0.00087
Case 7[27]	115.3 ppm	585000 ppm	0.00020
Case 8[27]	2344 ppm	316000 ppm	0.00742

The figures and tables used to determine these ratios are attached in Appendix D. Table 8 has eight different cases that have a wide range of values for the H_2S/ CH_4 Ratio. Each case was based on a total of 1 million ppm, if all the components of landfill gases were shown (Methane, CO_2, Nitrogen, Oxygen, H_2S, and other trace chemicals). Cases 1, 2, 4, 6, and 7 are a good representation of how much hydrogen sulfide can be found in an average landfill. Cases 3, 5, and 8 are worst case scenarios that show what the ratio was under extreme circumstances that normally are not seen, but are possible. Case 5 considered H_2S was 1% and accounted for all the trace chemical species, which is an overly conservative approach based on what is known about landfill gas and what was found in the literature review.

In Figueroa's thesis, Case 4 was the ratio used to determine the odor buffer distances. This ratio was determined to be not conservative enough since literature review of the composition of landfill gases showed all the other ratios to be higher than Case 4. It was determined for this study that a H_2S/ CH_4 ratio of 0.00013 was a more conservative approach and could be an accurate approach based on Cases 1 and 2.

Task 4: Set Limits

The task of setting limits was researched in the literature to decide the most reasonable 1-hour H_2S limits. Again these limits are for use when dealing with H_2S, since different odors have different thresholds. The 1-hour H_2S limits of >30 ppb, 15-30 ppb, and under 15 ppb were selected as discussed below: The >30 ppb has been used previously to set an exceedance level for H_2S. There are two examples of this. One would be the control of odorous gas at Massachusetts landfills, that is based on an average concentration of hydrogen sulfide measured in the ambient air at a location must be less than or equal to 15 ppb averaged over 8 hours or 30 ppb averaged over one hour.[7] The second example is the California ambient air quality standard (CAAQS) one-hour limit for hydrogen sulfide of 30 ppb.[26] Using these two examples and the researcher's judgment, the 1-hour H_2S limits were selected. Using Equation 1 from the methodology, the H_2S limits corresponding to the methane concentrations are listed in Table 9.

Table 9: Methane Concentration Limits

H_2S Limit	Methane Concentration
<15 ppb	<115 ppm
15-30 ppb	115-231 ppm
>30 ppb	>231 ppm

Tables similar to this can be created for other odors if it is determined H_2S is not the main contributor to odors at a certain landfill. Making the odor limits into methane concentrations also helps when generating plots because instead of making multiple plots for different odors anyone can just pull up the methane concentration limits for that odor and read them off one plot of methane concentrations for that landfill.

Task 5: Air Dispersion Modeling

The same methodology discussed previously was used to determine the methane concentration around the SCL landfill using the air dispersion modeling program AERMOD.

The meteorological data gathered is from January 1, 1999 to December 31, 2003. The hourly surface data is from the Orlando International Airport and the upper air data is from Ruskin, FL. The meteorological data for the year of 2001 was used for the research of the SCL, but any of the four years can be used. A 7.5-minute horizontal datum DEM file for Osceola was used creating two output files, one for the sources and one for the receptors. The receptor file was used when running AERMOD since the terrain is relatively the same as when the DEM file was created, but the source file was not used since we are dealing with a landfill whose terrain is constantly changing. Instead the topographic maps provided with the Surface Emission Monitoring reports were used to get accurate measurements of the terrain inside the landfill boundaries.

The input file was set up with an averaging time of 1-hour and the pollutant modeled in this case was methane. The source pathway specified the amount of sources, the emission rate for each source, and the base elevation of each source. The 4th Quarter 2006 had 178 point sources, the 2nd Quarter 2007 had 108 point sources, and the 2nd Quarter 2008 had 170 point sources (all these point sources were determined from task 2). AERMOD was then run (with 2001 meteorological data) and the 4th highest concentrations of methane in (ug/m^3) were recorded at all 300 receptors put in excel and converted to parts per million (ppm).The receptors 1-252 are the polar rings (36 receptors on each ring every 10 degrees) which correspond to distances of 800m, 900m, 1000m 1100m 1200m, 1300m, and 1400m from the center of the landfill. The receptors 252-300 represent the fence line of the Seminole County Landfill.

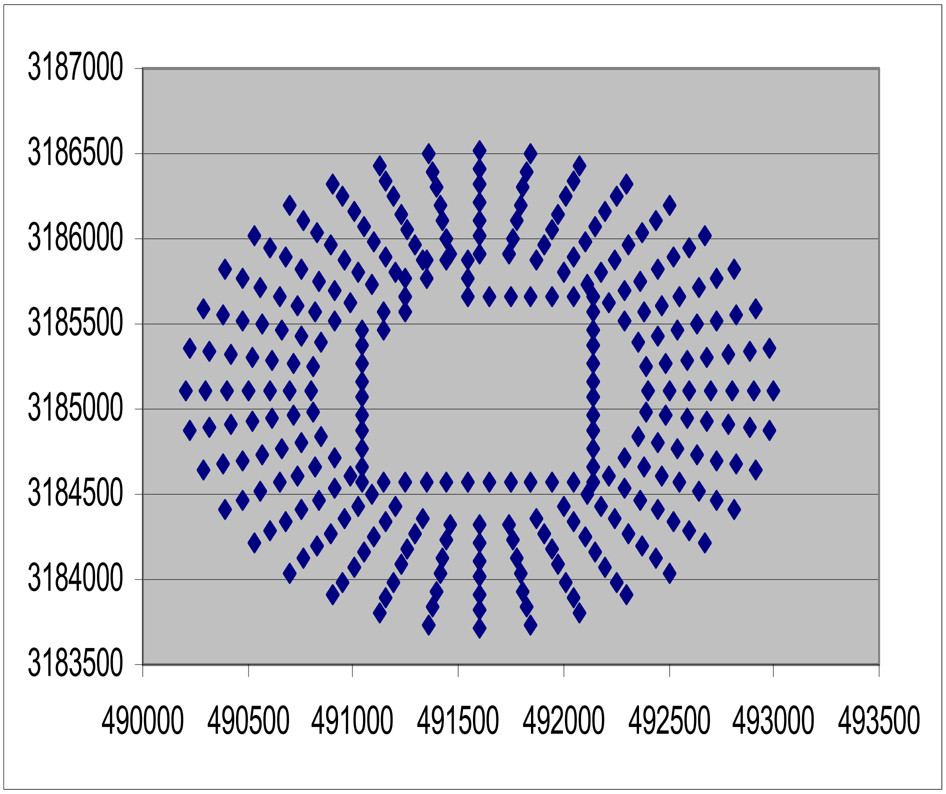


Figure 11: **Receptors Surrounding the Landfill**

The results are presented in Appendix E for the 4th quarter 2006, 2nd quarter 2007, and 2nd quarter 2008. It should be noted that most of the concentrations seen in Appendix E occurred during the hours of 2300-0900 (or 11p.m.-9a.m.). This is discussed further in the recommendations section and could lead to modeling for hours when most nuisance complaints happen rather then a full year of meteorological data, based on input from the community.

Task 6: Generate Plots

Using the methodology that was presented earlier, the results from the air dispersion modeling were used to generate color coded plots.

Since H_2S was used in this study the methane concentration limits for H_2S from Table 9 were used to create the plots for each quarter. H_2S is not the only odorous compound found in landfills and the ratio of an odorous compound to methane will change so Table 9 is only relevant for this study of H_2S.

The three limits are color coordinated with the colors of red, yellow, and green. The red zone is a “do not build zone” and corresponds to H_2S concentrations>30ppb (or methane >231 ppm). The yellow zone is a “proceed with caution” zone and corresponds to a H_2S from 15-30ppb (or methane from 115-231 ppm). The green zone is a “safe to build zone” and corresponds to H_2S concentrations<15ppb (or methane <115 ppm).

The three-color plots in the following pages are the findings from the 4^{th} Quarter 2006, 2^{nd} Quarter 2007, and 2^{nd} Quarter 2008 in order. From the three quarters of data the plots are expected to show an increasing trend of concentrations of H_2S, based primarily on the apparent increasing trend of total emissions from the landfill from 2006-2008.

The part that is not easily determined is where these expected higher concentrations are going to occur outside the landfill fence line from quarter to quarter. The meteorology experienced during a certain year plays a big role in this, but what was looked at before doing the air dispersion modeling is where the greatest point source emissions were coming from in the landfill. The isopleths of the point source methane emissions in grams/sec (created from the MATLAB results) are shown by quarter directly before the color generated plot of the air dispersion modeling figures. These isopleths of point source methane emissions give some clues to where the greatest concentrations of odors may occur even before air dispersion modeling is done.

Figure 12: **4th Quarter 2006 Methane Emission Isopleths**

Based on Figure 12 it was expected that the highest concentrations of odors are just outside the northeast part of the landfill, since this was where the greatest amounts of methane were being emitted. After doing the air dispersion modeling and looking at Figure 13 it can be inferred that the high methane emissions in Figure 12 are what caused the high concentrations of methane/odor just outside the northern fence line.

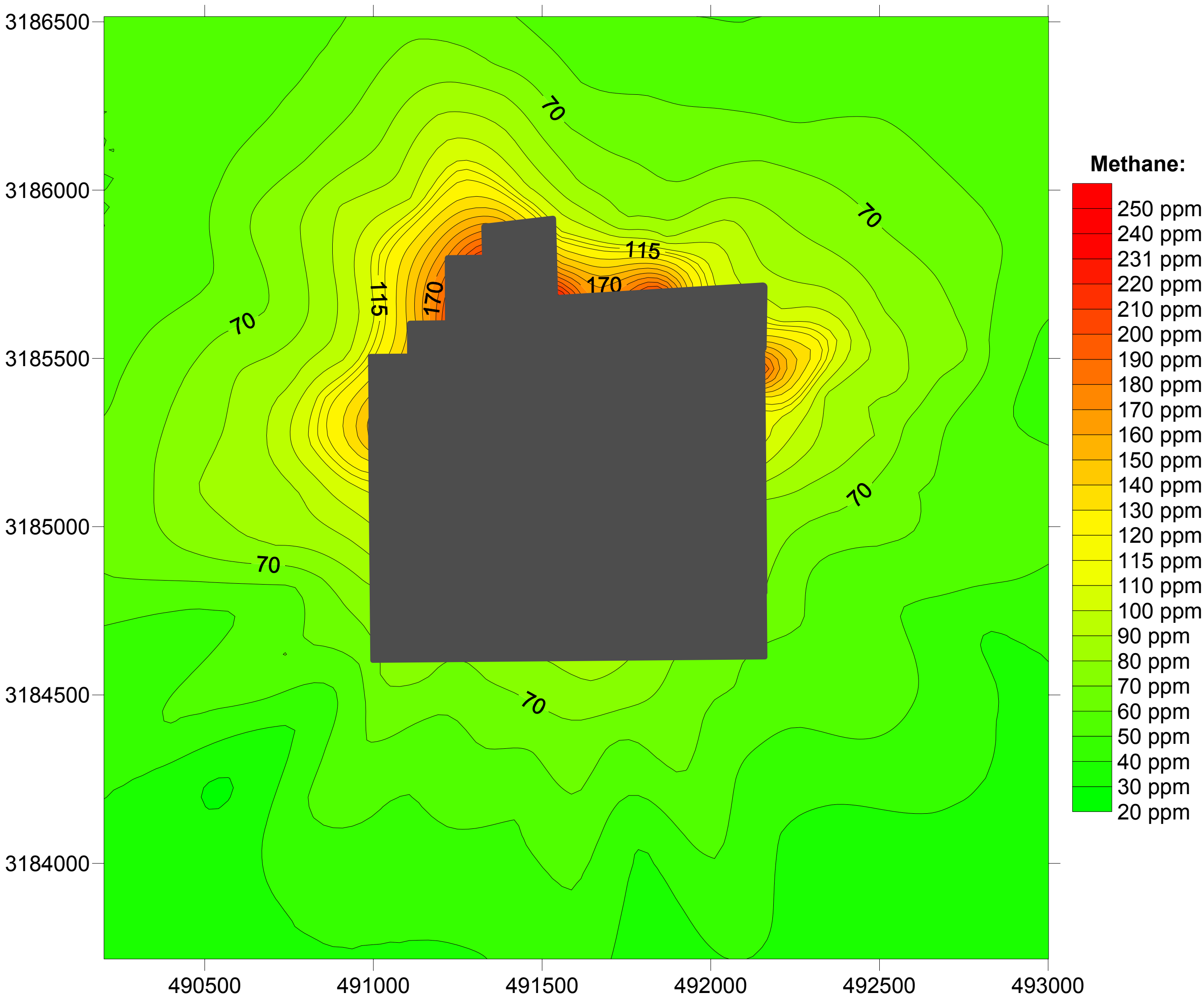


Figure 13: **4th Quarter 2006 Concentration Limit Plot**

Figure 14 showing the 2nd Quarter 2007 methane emission isopleths was also a good indicator of where the highest concentrations of methane/odor were going to occur. This time it was expected the highest concentrations of methane/odor were going to occur around the north-east quadrant of the landfill, with a smaller localized high just south of the landfill.

Figure 14: **2nd Quarter 2007 Methane Emission Isopleths**

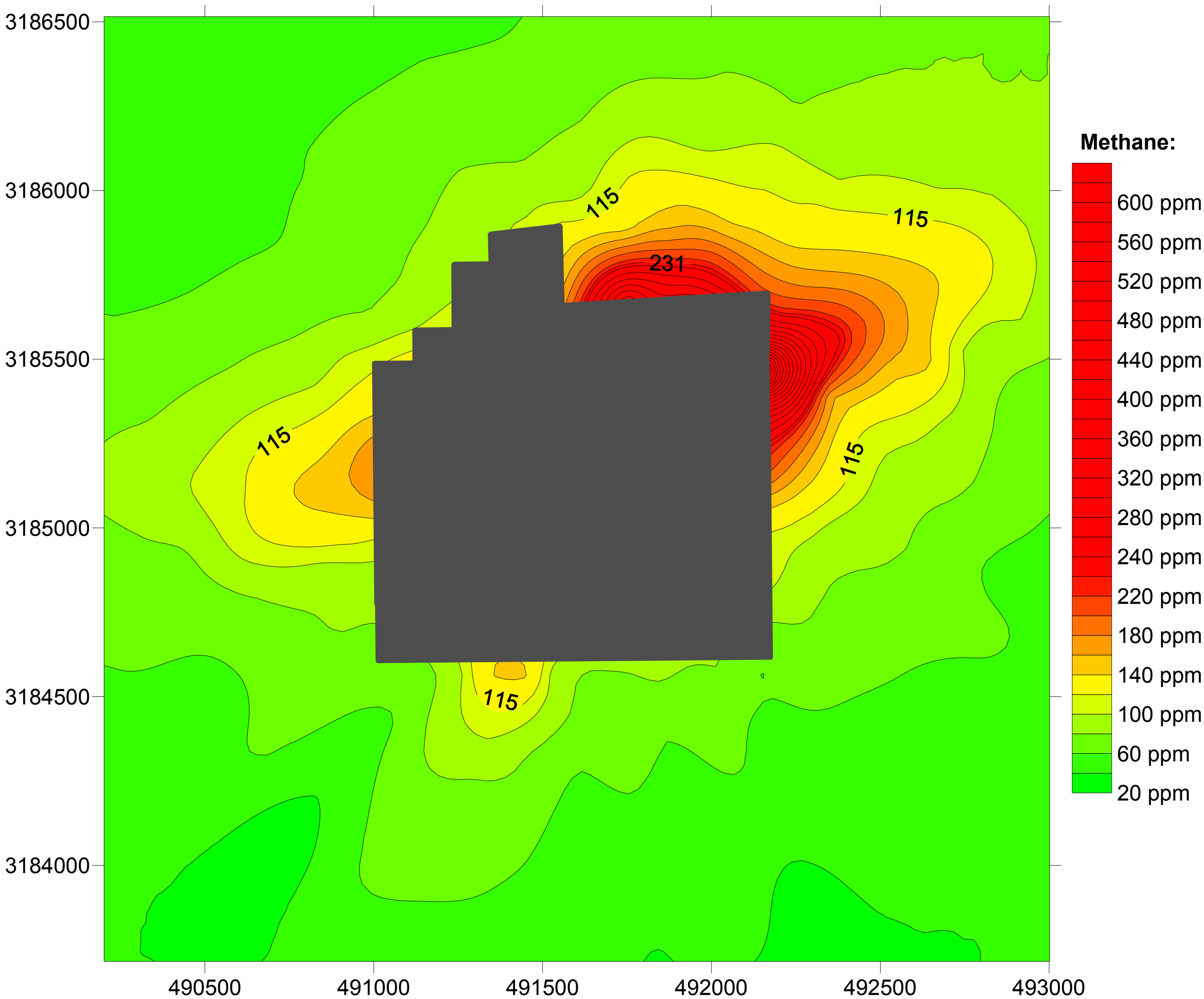


Figure 15: **2nd Quarter 2007 Concentration Limit Plot**

Figure 15 proves once again that the methane emission isopleths were a good indicator of where the high methane/odor concentrations would occur. Although the methane emissions isopleths indicated higher concentrations in the northeast and the higher concentration just to the south, the emission isopleths did not give a good indication of the higher concentration along the western edge of the landfill. Air dispersion modeling was the only way to pin point where the highest concentrations of methane/odors occurred in this case.

Figure 16: **2nd Quarter 2008 Methane Emission Isopleths**

The 2nd Quarter 2008 data is a great example of how odors around the landfill and methane emissions within the landfill are changing. Looking at Figure 17 we had an extremely low chance of odors occurring to the north and south of the landfill, while a high chance of high concentrations of methane/odors to the west and even higher methane/odor concentrations to the east existed. Modeling numerous quarters of data gives a greater level of confidence for determining where odors are occurring at any given time.

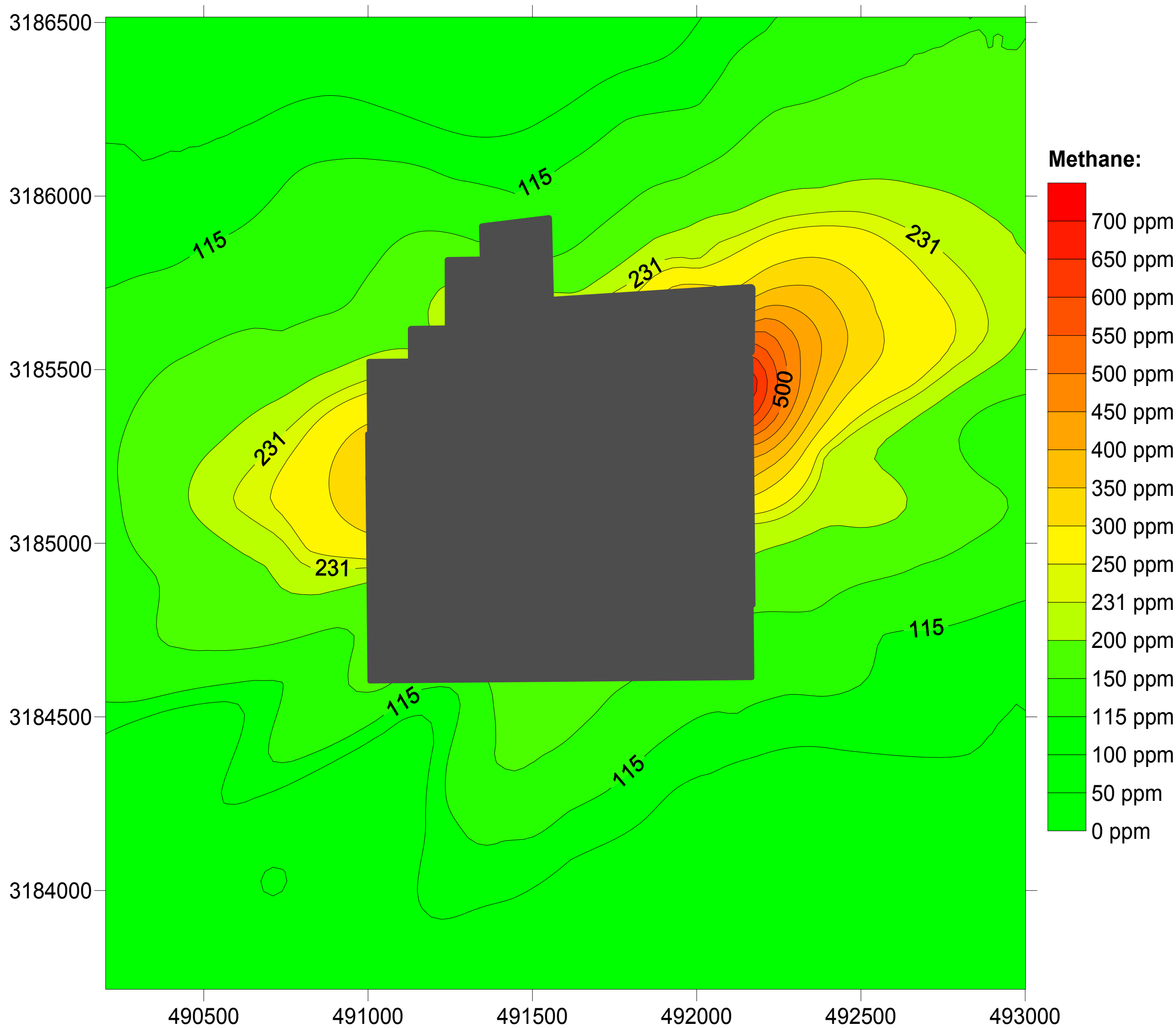


Figure 17: **2nd Quarter 2008 Concentration Limit Plot**

CHAPTER 5: CONCLUSIONS

Being able to predict where, at what concentration, and when odors are occurring is an issue that is affecting people moving into houses around landfills. So as odor complaints increase, the managing of odors is becoming a bigger issue. Using this thesis as the foundation and framework to determine odor buffer distances will help in increasing effective odor management. This thesis gives people the opportunity to evaluate how close they want to build to landfills and what they might experience in the way of odors depending on how close they do build.

This thesis also presents a new and promising way of estimating methane emissions from landfills. By using the Gaussian equation and the inverse modeling method, the total emissions can be estimated from a landfill and the point sources that are emitting methane within the landfill can estimated. The conclusions of this research include:

1) A methodology for estimating methane emissions from a landfill using the surface emissions monitoring reports taken every quarter has been developed. Using hundreds of ambient VOC measurements, and an inverse modeling method, the methane emissions can be calculated, both on a total basis and with a spatial distribution.

2) A methodology to estimate and derive an odorous gas to methane ratio was proposed. This ratio can be used to set limits that will help create odor buffer distances.

3) The air dispersion model AERMOD can be used to determine where these odors will occur and at what concentration.

4) Using the results from AERMOD and limits set for an odorous gas colored plots can be created to establish odor buffer distances.

CHAPTER 6: RECOMMENDATIONS

Further study is recommended to produce an even more accurate/specific methodology in estimating methane emissions and determining odor buffer distances. To accomplish this there are a series of further steps and analyses that can be done.

First the H_2S to methane ratio or any other odorous gas to methane ratio should be measured at the landfill during the required quarterly surface emissions monitoring report, rather then using average ratios from literature review. Also during the quarterly surface emission monitoring more accurate measurements of the meteorological parameters need to be done on site, since the estimation of methane emissions is so sensitive to these parameters. It is also recommended that several samples outside the landfill be tested for concentrations of the odorous gas to compare with the air dispersion modeling results. This will help in giving more accurate estimations of the odor buffer distances.

The next recommendation is to perform analysis of more quarters worth of data and to model another landfill. Using more quarters would not only give a more robust data set to work with but also determine if odors dramatically change from season to season (as of right now only two 2^{nd} Quarters and one 4^{th} quarter worth of emissions have been used). Using multiple landfills would also test the sensitivity of a landfill to the heights of a landfill, the surroundings of a landfill, the odorous gas to methane ratio (if one can be sampled), and the emissions from the landfill.

Future studies should include a more in-depth look at when odors occur and if that can affect the odor buffer distances. Most of the odors in this research were occurring at night when people are sleeping. This suggests research should concentrate more on odors that occur during the morning, afternoon, and early evening when more people are influenced by these odors.

Doing multiple landfills and quarters of data would help in determining if the highest concentrations of odors occur at night when most people are sleeping.

APPENDIX A: SEMINOLE COUNTY LANDFILL VOC MEASUREMENTS (CONDUCTED BY SCS FIELD SERVICES)

Environmental Consultants

3012 U.S. Highway 301 North
Suite 700
Tampa, FL 33619-2242

813 630-2109
FAX 813 630-1790
www.scsengineers.com

SCS FIELD SERVICES

January 30, 2007
SCS File No. 09206066.02

COPY

David Gregory
Solid Waste Director
Seminole County Landfill
1930 E. Osceola Road
Geneva, FL 32773-7499

Subject: Results of Fourth Quarter 2006 Surface Emissions Monitoring, Seminole County Landfill, Geneva, FL

Dear David:

On December 22, 2006, SCS Field Services (SCS-FS) conducted surface emissions monitoring at the subject location, as specified in 40 CFR 60.755 (c) and (d), and 40 CFR 60, Appendix A, Method 21. These regulations require surface monitoring around the perimeter of and within the LFG Collection System area, the extent of which includes landfill areas where waste exceeds two years in age at final grade or five years in age at interim grades.

Monitoring was completed in accordance with the regulations. A total of 425 points were surveyed for emissions of volatile organic compounds (VOC), as methane, using a Landtec SEM 500 flame ionization detector.

Over the area surveyed, no points exceeded 500 ppm above background. As such, no additional monitoring or remedial action was required for this quarter. The monitoring data is attached.

SCS-FS, an employee-owned company, thanks you for using our services. Please contact either of the undersigned if you require further information.

Sincerely,

Garold (Tony) A. Cartee
Project Manager
SCS FIELD SERVICES

Peter J. Carrico
Vice President
SCS FIELD SERVICES

Attachment

SCS Field Services, Inc.

NSPS Surface Emissions Monitoring
Calibration and Pertinent Data Form

Date: 22 Dec 06 Site Name: Seminole County LF Job Number: 09206066.

Technician(s): Scott Lambert

Weather Observations

Wind Speed: 0-2 MPH Wind Direction: out of SE Barometric Pressure: 30.12 "Hg

Air Temperature 70° °F General Weather Conditions: Clear

Calibration Information

Pre-monitoring Calibration Precision Check

Procedure: Calibrate the instrument. Make a total of three measurements by alternating zero air and the calibration gas. Record the readings and calculate the average algebraic difference between the instrument reading and the calibration gas as a percentage. The calibration precision must be less than or equal to 10% of the calibration gas value.

Instrument ID: TVA Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	Cal Gas Conc. – Cal Gas Reading
1	0.94	504	500 504 4
2	0.98	500	500 500 0
3	0.97	501	500 501 1

Average Difference: 1.6

Calibration Precision = Average Difference/Cal Gas Conc. X 100%
= 1.6 / 500 X 100%
= 0.32 %

Post-monitoring Calibration Check

Zero Air Reading: 0.98 ppm Cal Gas Reading 505 ppm

Background Concentration Checks

Upwind Location Description: SE Side of LF Reading: 3.10 ppm
Downwind Location Description: NW Side of LF Reading: 6.12 ppm

Notes/Comments

No exceedances, High Reading in Area of Tag 246 thru Tag 252, Dry mulch cover.

C:\Documents\NSPScalform.doc 8/15/2000

Seminole County Landfill
4th Quarter 2006 SEM Monitoring Data

Date	Time	Monitoring Tag	FID Concentration	Unit	Notes
22-Dec-06	7:47:07	500PPM	504	PPM	
22-Dec-06	7:49:03	ZERO GAS	0.96	PPM	OK
22-Dec-06	7:51:58	UPWIND	3.1	PPM	OK
22-Dec-06	7:55:18	DOWN WIND	6.12	PPM	OK
22-Dec-06	8:02:04	1	3.89	PPM	OK
22-Dec-06	8:02:30	2	1.79	PPM	OK
22-Dec-06	8:02:50	3	1.87	PPM	OK
22-Dec-06	8:03:09	4	2.23	PPM	OK
22-Dec-06	8:03:28	5	2.42	PPM	OK
22-Dec-06	8:03:41	6	2.59	PPM	OK
22-Dec-06	8:04:00	7	1.81	PPM	OK
22-Dec-06	8:04:19	8	1.62	PPM	OK
22-Dec-06	8:04:39	9	1.83	PPM	OK
22-Dec-06	8:04:59	10	1.81	PPM	OK
22-Dec-06	8:05:20	11	2.08	PPM	OK
22-Dec-06	8:05:41	12	2.14	PPM	OK
22-Dec-06	8:06:01	13	3.2	PPM	OK
22-Dec-06	8:06:22	14	2.37	PPM	OK
22-Dec-06	8:06:42	15	5.12	PPM	OK
22-Dec-06	8:07:05	16	5.14	PPM	OK
22-Dec-06	8:07:28	17	26.33	PPM	OK
22-Dec-06	8:07:50	18	25.85	PPM	OK
22-Dec-06	8:08:10	19	11.42	PPM	OK
22-Dec-06	8:08:33	20	12.81	PPM	OK
22-Dec-06	8:09:01	21	12.68	PPM	OK
22-Dec-06	8:09:23	22	11.25	PPM	OK
22-Dec-06	8:09:44	23	12.31	PPM	OK
22-Dec-06	8:10:07	24	83.95	PPM	OK
22-Dec-06	8:12:20	25	26.83	PPM	OK
22-Dec-06	8:12:44	26	15.88	PPM	OK
22-Dec-06	8:13:09	27	15.97	PPM	OK
22-Dec-06	8:13:37	28	18.59	PPM	OK
22-Dec-06	8:13:59	29	7.96	PPM	OK
22-Dec-06	8:14:21	30	4.09	PPM	OK
22-Dec-06	8:14:46	31	3.21	PPM	OK
22-Dec-06	8:16:19	32	41.04	PPM	OK
22-Dec-06	8:17:35	33	24.85	PPM	OK
22-Dec-06	8:17:56	34	39.06	PPM	OK
22-Dec-06	8:18:16	35	32.81	PPM	OK
22-Dec-06	8:18:36	36	12.35	PPM	OK
22-Dec-06	8:18:57	37	10.14	PPM	OK
22-Dec-06	8:19:20	38	9.81	PPM	OK
22-Dec-06	8:19:42	39	43.95	PPM	OK
22-Dec-06	8:20:34	40	104	PPM	OK
22-Dec-06	8:22:29	41	71.98	PPM	OK
22-Dec-06	8:22:49	42	33.19	PPM	OK
22-Dec-06	8:23:27	43	49.52	PPM	OK
22-Dec-06	8:24:21	44	70.36	PPM	OK
22-Dec-06	8:24:59	45	146	PPM	OK
22-Dec-06	8:25:50	46	85.42	PPM	OK

Seminole County Landfill
4th Quarter 2006 SEM Monitoring Data

Date	Time	Monitoring Tag	FID Concentration	Unit	Notes
22-Dec-06	8:26:40	47	32.92	PPM	OK
22-Dec-06	8:26:57	48	157	PPM	OK
22-Dec-06	8:27:22	49	21.26	PPM	OK
22-Dec-06	8:27:44	50	25.23	PPM	OK
22-Dec-06	8:28:15	51	7.65	PPM	OK
22-Dec-06	8:29:05	52	5.84	PPM	OK
22-Dec-06	8:29:28	53	15.73	PPM	OK
22-Dec-06	8:29:45	54	26.38	PPM	OK
22-Dec-06	8:30:25	55	2.34	PPM	OK
22-Dec-06	8:30:49	56	3.68	PPM	OK
22-Dec-06	8:31:13	57	19.32	PPM	OK
22-Dec-06	8:31:51	58	22.66	PPM	OK
22-Dec-06	8:32:29	59	14.68	PPM	OK
22-Dec-06	8:32:57	60	21.5	PPM	OK
22-Dec-06	8:33:13	61	10.53	PPM	OK
22-Dec-06	8:33:32	62	21.2	PPM	OK
22-Dec-06	8:33:52	63	11.41	PPM	OK
22-Dec-06	8:34:28	64	18.47	PPM	OK
22-Dec-06	8:35:10	65	7.81	PPM	OK
22-Dec-06	8:35:35	66	5.48	PPM	OK
22-Dec-06	8:35:57	67	3.29	PPM	OK
22-Dec-06	8:36:28	68	6.1	PPM	OK
22-Dec-06	8:38:00	69	7.44	PPM	OK
22-Dec-06	8:38:44	70	79.93	PPM	OK
22-Dec-06	8:39:10	71	4.22	PPM	OK
22-Dec-06	8:39:47	72	3.38	PPM	OK
22-Dec-06	8:40:53	73	5.45	PPM	OK
22-Dec-06	8:41:16	74	5.78	PPM	OK
22-Dec-06	8:41:45	75	8.92	PPM	OK
22-Dec-06	8:42:13	76	3.16	PPM	OK
22-Dec-06	8:42:34	77	3.05	PPM	OK
22-Dec-06	8:42:56	78	7.98	PPM	OK
22-Dec-06	8:43:18	79	45.64	PPM	OK
22-Dec-06	8:43:39	80	7.43	PPM	OK
22-Dec-06	8:44:08	81	21.06	PPM	OK
22-Dec-06	8:44:30	82	11.08	PPM	OK
22-Dec-06	8:44:56	83	5.63	PPM	OK
22-Dec-06	8:45:16	84	6.37	PPM	OK
22-Dec-06	8:45:37	85	5.37	PPM	OK
22-Dec-06	8:46:40	86	6.03	PPM	OK
22-Dec-06	8:47:06	87	6.34	PPM	OK
22-Dec-06	8:47:29	88	7.02	PPM	OK
22-Dec-06	8:48:48	89	9.18	PPM	OK
22-Dec-06	8:49:24	90	9.96	PPM	OK
22-Dec-06	8:49:57	91	9.18	PPM	OK
22-Dec-06	8:51:29	92	8.11	PPM	OK
22-Dec-06	8:53:03	93	14.61	PPM	OK
22-Dec-06	8:53:42	94	7.55	PPM	OK
22-Dec-06	8:54:29	95	8.86	PPM	OK
22-Dec-06	8:54:49	96	10.68	PPM	OK

Seminole County Landfill
4th Quarter 2006 SEM Monitoring Data

Date	Time	Monitoring Tag	FID Concentration	Unit	Notes
22-Dec-06	8:55:14	97	8.75	PPM	OK
22-Dec-06	8:55:44	98	6.67	PPM	OK
22-Dec-06	8:55:58	99	7	PPM	OK
22-Dec-06	8:56:11	100	6.29	PPM	OK
22-Dec-06	8:56:40	101	6.98	PPM	OK
22-Dec-06	8:57:22	102	8.07	PPM	OK
22-Dec-06	8:57:44	103	4.55	PPM	OK
22-Dec-06	8:58:26	104	30.12	PPM	OK
22-Dec-06	8:59:15	105	123	PPM	OK
22-Dec-06	9:00:08	106	15.13	PPM	OK
22-Dec-06	9:00:33	107	5.11	PPM	OK
22-Dec-06	9:01:05	108	7.45	PPM	OK
22-Dec-06	9:01:47	109	11.82	PPM	OK
22-Dec-06	9:02:17	110	4.28	PPM	OK
22-Dec-06	9:02:38	111	5.04	PPM	OK
22-Dec-06	9:03:03	112	3.96	PPM	OK
22-Dec-06	9:03:36	113	3.45	PPM	OK
22-Dec-06	9:04:01	114	3.97	PPM	OK
22-Dec-06	9:04:32	115	13.58	PPM	OK
22-Dec-06	9:05:17	116	11.97	PPM	OK
22-Dec-06	9:06:05	117	6.54	PPM	OK
22-Dec-06	9:07:13	118	4.73	PPM	OK
22-Dec-06	9:08:20	119	5.27	PPM	OK
22-Dec-06	9:08:50	120	5.36	PPM	OK
22-Dec-06	9:10:03	121	4.31	PPM	OK
22-Dec-06	9:10:47	122	4.82	PPM	OK
22-Dec-06	9:11:23	123	4.89	PPM	OK
22-Dec-06	9:11:46	124	5.17	PPM	OK
22-Dec-06	9:12:09	125	4.51	PPM	OK
22-Dec-06	9:12:33	126	14.08	PPM	OK
22-Dec-06	9:13:02	127	13.2	PPM	OK
22-Dec-06	9:13:23	128	10.34	PPM	OK
22-Dec-06	9:13:50	129	33.31	PPM	OK
22-Dec-06	9:15:35	130	10.95	PPM	OK
22-Dec-06	9:16:03	131	9.04	PPM	OK
22-Dec-06	9:16:26	132	11.25	PPM	OK
22-Dec-06	9:17:06	133	5.97	PPM	OK
22-Dec-06	9:17:43	134	6.59	PPM	OK
22-Dec-06	9:19:55	135	7.4	PPM	OK
22-Dec-06	9:20:22	136	6.79	PPM	OK
22-Dec-06	9:20:45	137	8.36	PPM	OK
22-Dec-06	9:21:28	138	12.05	PPM	OK
22-Dec-06	9:21:50	139	18.69	PPM	OK
22-Dec-06	9:22:15	140	6.92	PPM	OK
22-Dec-06	9:22:49	141	6.34	PPM	OK
22-Dec-06	9:23:24	142	5.72	PPM	OK
22-Dec-06	9:23:46	143	5.54	PPM	OK
22-Dec-06	9:24:09	144	5.07	PPM	OK
22-Dec-06	9:24:33	145	5.06	PPM	OK
22-Dec-06	9:24:56	146	9.21	PPM	OK

Seminole County Landfill
4th Quarter 2006 SEM Monitoring Data

Date	Time	Monitoring Tag	FID Concentration	Unit	Notes
22-Dec-06	9:25:17	147	4.66	PPM	OK
22-Dec-06	9:25:41	148	4.24	PPM	OK
22-Dec-06	9:27:08	149	4.01	PPM	OK
22-Dec-06	9:28:04	150	4.93	PPM	OK
22-Dec-06	9:28:53	151	5.63	PPM	OK
22-Dec-06	9:29:45	152	6.3	PPM	OK
22-Dec-06	9:30:12	153	9.92	PPM	OK
22-Dec-06	9:31:07	154	50.59	PPM	OK
22-Dec-06	9:31:47	155	9.14	PPM	OK
22-Dec-06	9:32:18	156	5.38	PPM	OK
22-Dec-06	9:32:53	157	6.39	PPM	OK
22-Dec-06	9:33:29	158	7.05	PPM	OK
22-Dec-06	9:33:53	159	43.22	PPM	OK
22-Dec-06	9:34:21	160	14.24	PPM	OK
22-Dec-06	9:34:54	161	8.31	PPM	OK
22-Dec-06	9:35:30	162	10.05	PPM	OK
22-Dec-06	9:36:23	163	5.34	PPM	OK
22-Dec-06	9:36:51	164	4.64	PPM	OK
22-Dec-06	9:37:16	165	6.75	PPM	OK
22-Dec-06	9:37:38	166	7.18	PPM	OK
22-Dec-06	9:38:31	167	7.99	PPM	OK
22-Dec-06	9:39:22	168	8.33	PPM	OK
22-Dec-06	9:39:43	169	9.31	PPM	OK
22-Dec-06	9:40:06	170	41.41	PPM	OK
22-Dec-06	9:40:23	171	23.25	PPM	OK
22-Dec-06	9:41:32	172	5.82	PPM	OK
22-Dec-06	9:41:48	173	6.12	PPM	OK
22-Dec-06	9:42:11	174	5.75	PPM	OK
22-Dec-06	9:42:33	175	5.67	PPM	OK
22-Dec-06	9:42:55	176	6.42	PPM	OK
22-Dec-06	9:43:17	177	6.25	PPM	OK
22-Dec-06	9:43:41	178	5.97	PPM	OK
22-Dec-06	9:44:42	179	6.82	PPM	OK
22-Dec-06	9:46:05	180	6.18	PPM	OK
22-Dec-06	9:46:46	181	6.34	PPM	OK
22-Dec-06	9:47:35	182	9.03	PPM	OK
22-Dec-06	9:48:04	183	8.2	PPM	OK
22-Dec-06	9:48:34	184	49.74	PPM	OK
22-Dec-06	9:48:59	185	7.2	PPM	OK
22-Dec-06	9:49:19	186	9.41	PPM	OK
22-Dec-06	9:49:41	187	9.56	PPM	OK
22-Dec-06	9:50:39	188	12.47	PPM	OK
22-Dec-06	9:51:12	189	5.17	PPM	OK
22-Dec-06	9:52:02	190	5.78	PPM	OK
22-Dec-06	9:52:18	191	5.49	PPM	OK
22-Dec-06	9:52:44	192	6.27	PPM	OK
22-Dec-06	9:53:04	193	8.44	PPM	OK
22-Dec-06	9:53:26	194	8.92	PPM	OK
22-Dec-06	9:53:51	195	6.38	PPM	OK
22-Dec-06	9:54:32	196	5.45	PPM	OK

Seminole County Landfill
4th Quarter 2006 SEM Monitoring Data

Date	Time	Monitoring Tag	FID Concentration	Unit	Notes
22-Dec-06	9:54:49	197	5.48	PPM	OK
22-Dec-06	9:55:25	198	5.89	PPM	OK
22-Dec-06	9:55:47	199	6.07	PPM	OK
22-Dec-06	9:56:13	200	6.59	PPM	OK
22-Dec-06	9:56:35	201	7.09	PPM	OK
22-Dec-06	9:56:54	202	8.8	PPM	OK
22-Dec-06	9:57:15	203	9.08	PPM	OK
22-Dec-06	9:57:31	204	9.12	PPM	OK
22-Dec-06	9:57:51	205	13.53	PPM	OK
22-Dec-06	9:58:12	206	8.88	PPM	OK
22-Dec-06	9:58:36	207	10.03	PPM	OK
22-Dec-06	9:58:56	208	7.58	PPM	OK
22-Dec-06	9:59:20	209	8.58	PPM	OK
22-Dec-06	10:26:29	210	3.31	PPM	OK
22-Dec-06	10:27:03	211	4.2	PPM	OK
22-Dec-06	10:27:48	212	9.39	PPM	OK
22-Dec-06	10:28:15	213	8.02	PPM	OK
22-Dec-06	10:28:37	214	4.83	PPM	OK
22-Dec-06	10:28:59	215	4.77	PPM	OK
22-Dec-06	10:29:19	216	4.66	PPM	OK
22-Dec-06	10:30:56	217	3.75	PPM	OK
22-Dec-06	10:31:14	218	3.94	PPM	OK
22-Dec-06	10:31:34	219	4.45	PPM	OK
22-Dec-06	10:31:55	220	4.79	PPM	OK
22-Dec-06	10:32:23	221	5.5	PPM	OK
22-Dec-06	10:32:49	222	4.45	PPM	OK
22-Dec-06	10:33:13	223	6.12	PPM	OK
22-Dec-06	10:33:35	224	6.41	PPM	OK
22-Dec-06	10:33:59	225	5.03	PPM	OK
22-Dec-06	10:34:21	226	6.09	PPM	OK
22-Dec-06	10:34:50	227	6.21	PPM	OK
22-Dec-06	10:34:56	228	5.04	PPM	OK
22-Dec-06	10:35:19	229	6.69	PPM	OK
22-Dec-06	10:35:58	230	5.25	PPM	OK
22-Dec-06	10:36:25	231	5.71	PPM	OK
22-Dec-06	10:36:47	232	6.73	PPM	OK
22-Dec-06	10:37:25	233	7.07	PPM	OK
22-Dec-06	10:38:47	234	7.38	PPM	OK
22-Dec-06	10:39:09	235	36.81	PPM	OK
22-Dec-06	10:39:42	236	6.9	PPM	OK
22-Dec-06	10:40:34	237	53.58	PPM	OK
22-Dec-06	10:40:59	238	18.17	PPM	OK
22-Dec-06	10:41:36	239	71.85	PPM	OK
22-Dec-06	10:42:55	240	14.38	PPM	OK
22-Dec-06	10:43:18	241	105	PPM	OK
22-Dec-06	10:43:51	242	109	PPM	OK
22-Dec-06	10:44:36	243	190	PPM	OK
22-Dec-06	10:44:50	244	123	PPM	OK
22-Dec-06	10:45:24	245	403	PPM	OK
22-Dec-06	10:46:41	246	168	PPM	OK

Seminole County Landfill
4th Quarter 2006 SEM Monitoring Data

Date	Time	Monitoring Tag	FID Concentration	Unit	Notes
22-Dec-06	10:47:34	247	197	PPM	OK
22-Dec-06	10:48:38	248	266	PPM	OK
22-Dec-06	10:49:25	249	185	PPM	OK
22-Dec-06	10:49:51	250	325	PPM	OK
22-Dec-06	10:50:32	251	97.15	PPM	OK
22-Dec-06	10:51:20	252	88.09	PPM	OK
22-Dec-06	10:51:44	253	115	PPM	OK
22-Dec-06	10:53:08	254	51.76	PPM	OK
22-Dec-06	10:54:16	255	36.65	PPM	OK
22-Dec-06	10:55:09	256	62.22	PPM	OK
22-Dec-06	10:55:53	257	177	PPM	OK
22-Dec-06	10:56:19	258	88.85	PPM	OK
22-Dec-06	10:57:10	259	99.02	PPM	OK
22-Dec-06	10:58:18	260	39.47	PPM	OK
22-Dec-06	10:59:25	261	17.99	PPM	OK
22-Dec-06	11:00:09	262	32.54	PPM	OK
22-Dec-06	11:01:26	263	9.33	PPM	OK
22-Dec-06	11:01:55	264	11.42	PPM	OK
22-Dec-06	11:02:24	265	11.1	PPM	OK
22-Dec-06	11:02:38	266	32.13	PPM	OK
22-Dec-06	11:03:11	267	8.44	PPM	OK
22-Dec-06	11:03:52	268	5.86	PPM	OK
22-Dec-06	11:08:39	269	6.21	PPM	OK
22-Dec-06	11:09:12	270	38.49	PPM	OK
22-Dec-06	11:09:31	271	75.39	PPM	OK
22-Dec-06	11:10:19	272	22.45	PPM	OK
22-Dec-06	11:10:36	273	26.3	PPM	OK
22-Dec-06	11:11:01	274	66.24	PPM	OK
22-Dec-06	11:11:21	275	40.53	PPM	OK
22-Dec-06	11:11:44	276	64.02	PPM	OK
22-Dec-06	11:12:04	277	60.85	PPM	OK
22-Dec-06	11:13:26	278	19.52	PPM	OK
22-Dec-06	11:14:06	279	21.76	PPM	OK
22-Dec-06	11:14:30	280	23.24	PPM	OK
22-Dec-06	11:15:19	281	23.72	PPM	OK
22-Dec-06	11:15:51	282	23.92	PPM	OK
22-Dec-06	11:16:16	283	49.86	PPM	OK
22-Dec-06	11:17:02	284	44.7	PPM	OK
22-Dec-06	11:17:27	285	27.02	PPM	OK
22-Dec-06	11:17:52	286	10.03	PPM	OK
22-Dec-06	11:18:14	287	57.19	PPM	OK
22-Dec-06	11:18:42	288	56.96	PPM	OK
22-Dec-06	11:19:05	289	67.55	PPM	OK
22-Dec-06	11:19:33	290	18.38	PPM	OK
22-Dec-06	11:20:18	291	24.39	PPM	OK
22-Dec-06	11:21:00	292	103	PPM	OK
22-Dec-06	11:21:25	293	150	PPM	OK
22-Dec-06	11:21:54	294	159	PPM	OK
22-Dec-06	11:22:49	295	63.78	PPM	OK
22-Dec-06	11:23:11	296	43.56	PPM	OK

Seminole County Landfill
4th Quarter 2006 SEM Monitoring Data

Date	Time	Monitoring Tag	FID Concentration	Unit	Notes
22-Dec-06	11:23:53	297	25.44	PPM	OK
22-Dec-06	11:24:21	298	84.79	PPM	OK
22-Dec-06	11:24:43	299	79.76	PPM	OK
22-Dec-06	11:25:02	300	92.17	PPM	OK
22-Dec-06	11:25:59	301	127	PPM	OK
22-Dec-06	11:26:20	302	114	PPM	OK
22-Dec-06	11:26:37	303	79.47	PPM	OK
22-Dec-06	11:26:58	304	61.02	PPM	OK
22-Dec-06	11:27:32	305	63.69	PPM	OK
22-Dec-06	11:27:59	306	38.15	PPM	OK
22-Dec-06	11:28:19	307	36.32	PPM	OK
22-Dec-06	11:28:46	308	41.43	PPM	OK
22-Dec-06	11:29:09	309	38.49	PPM	OK
22-Dec-06	11:29:30	310	35.37	PPM	OK
22-Dec-06	11:29:49	311	26.55	PPM	OK
22-Dec-06	11:30:10	312	38.53	PPM	OK
22-Dec-06	11:30:31	313	48.27	PPM	OK
22-Dec-06	11:31:00	314	32.41	PPM	OK
22-Dec-06	11:31:22	315	22.32	PPM	OK
22-Dec-06	11:31:47	316	28.43	PPM	OK
22-Dec-06	11:32:11	317	26.16	PPM	OK
22-Dec-06	11:32:59	318	43.84	PPM	OK
22-Dec-06	11:33:23	319	20.09	PPM	OK
22-Dec-06	11:34:17	320	48.02	PPM	OK
22-Dec-06	11:34:42	321	9.38	PPM	OK
22-Dec-06	11:35:10	322	13.85	PPM	OK
22-Dec-06	11:35:47	323	25.95	PPM	OK
22-Dec-06	11:37:21	324	18.78	PPM	OK
22-Dec-06	11:38:13	325	21.16	PPM	OK
22-Dec-06	11:38:53	326	10.31	PPM	OK
22-Dec-06	11:39:41	327	16.22	PPM	OK
22-Dec-06	11:40:28	328	17.82	PPM	OK
22-Dec-06	11:40:55	329	35.42	PPM	OK
22-Dec-06	11:41:30	330	37.01	PPM	OK
22-Dec-06	11:42:02	331	16.05	PPM	OK
22-Dec-06	11:42:29	332	36.76	PPM	OK
22-Dec-06	11:43:25	333	94.6	PPM	OK
22-Dec-06	11:44:02	334	56.21	PPM	OK
22-Dec-06	11:44:36	335	59.29	PPM	OK
22-Dec-06	11:45:24	336	39.53	PPM	OK
22-Dec-06	11:45:49	337	66.21	PPM	OK
22-Dec-06	11:46:11	338	23.78	PPM	OK
22-Dec-06	11:46:33	339	49.19	PPM	OK
22-Dec-06	11:46:46	340	32.11	PPM	OK
22-Dec-06	11:47:57	341	33.59	PPM	OK
22-Dec-06	11:48:21	342	14.97	PPM	OK
22-Dec-06	11:48:48	343	26.57	PPM	OK
22-Dec-06	11:49:17	344	45.64	PPM	OK
22-Dec-06	11:49:40	345	58.1	PPM	OK
22-Dec-06	11:50:07	346	49.06	PPM	OK

Seminole County Landfill
4th Quarter 2006 SEM Monitoring Data

Date	Time	Monitoring Tag	FID Concentration	Unit	Notes
22-Dec-06	11:50:28	347	75.66	PPM	OK
22-Dec-06	11:50:56	348	63.96	PPM	OK
22-Dec-06	11:51:07	349	31.74	PPM	OK
22-Dec-06	11:51:54	350	77.29	PPM	OK
22-Dec-06	11:52:16	351	117	PPM	OK
22-Dec-06	11:53:04	352	153	PPM	OK
22-Dec-06	11:53:37	353	36.84	PPM	OK
22-Dec-06	11:55:10	354	245	PPM	OK
22-Dec-06	11:56:02	355	74.76	PPM	OK
22-Dec-06	11:56:49	356	64.74	PPM	OK
22-Dec-06	11:57:24	357	121	PPM	OK
22-Dec-06	11:57:51	358	69.99	PPM	OK
22-Dec-06	11:59:05	359	80.94	PPM	OK
22-Dec-06	11:59:42	360	52.75	PPM	OK
22-Dec-06	12:00:40	361	179	PPM	OK
22-Dec-06	12:01:25	362	27	PPM	OK
22-Dec-06	12:01:54	363	22.53	PPM	OK
22-Dec-06	12:02:20	364	33.86	PPM	OK
22-Dec-06	12:02:42	365	40.99	PPM	OK
22-Dec-06	12:03:08	366	29.89	PPM	OK
22-Dec-06	12:03:31	367	22.18	PPM	OK
22-Dec-06	12:03:58	368	18.75	PPM	OK
22-Dec-06	12:04:16	369	18.77	PPM	OK
22-Dec-06	12:04:37	370	33.56	PPM	OK
22-Dec-06	12:04:56	371	31.92	PPM	OK
22-Dec-06	12:05:16	372	16.78	PPM	OK
22-Dec-06	12:05:35	373	28.1	PPM	OK
22-Dec-06	12:05:54	374	82.62	PPM	OK
22-Dec-06	12:06:13	375	27.21	PPM	OK
22-Dec-06	12:06:33	376	54.07	PPM	OK
22-Dec-06	12:06:54	377	18.86	PPM	OK
22-Dec-06	12:07:16	378	10.52	PPM	OK
22-Dec-06	12:07:38	379	8.44	PPM	OK
22-Dec-06	12:08:15	380	8.23	PPM	OK
22-Dec-06	12:08:42	381	7.62	PPM	OK
22-Dec-06	12:08:59	382	13.89	PPM	OK
22-Dec-06	12:09:42	383	17.75	PPM	OK
22-Dec-06	12:10:34	384	15.33	PPM	OK
22-Dec-06	12:11:07	385	50.25	PPM	OK
22-Dec-06	12:11:39	386	89.95	PPM	OK
22-Dec-06	12:12:44	387	24.14	PPM	OK
22-Dec-06	12:13:16	388	34.27	PPM	OK
22-Dec-06	12:13:39	389	62.45	PPM	OK
22-Dec-06	12:14:09	390	17.25	PPM	OK
22-Dec-06	12:14:45	391	26.2	PPM	OK
22-Dec-06	12:15:07	392	27.88	PPM	OK
22-Dec-06	12:15:38	393	72.22	PPM	OK
22-Dec-06	12:16:10	394	127	PPM	OK
22-Dec-06	12:16:38	395	97.28	PPM	OK
22-Dec-06	12:17:04	396	57.53	PPM	OK

Seminole County Landfill
4th Quarter 2006 SEM Monitoring Data

Date	Time	Monitoring Tag	FID Concentration	Unit	Notes
22-Dec-06	12:17:23	397	117	PPM	OK
22-Dec-06	12:17:52	398	63.36	PPM	OK
22-Dec-06	12:18:37	399	42.04	PPM	OK
22-Dec-06	12:19:25	400	46.28	PPM	OK
22-Dec-06	12:19:42	401	155	PPM	OK
22-Dec-06	12:19:59	402	98.3	PPM	OK
22-Dec-06	12:20:13	403	60.38	PPM	OK
22-Dec-06	12:20:30	404	76.96	PPM	OK
22-Dec-06	12:20:51	405	65.13	PPM	OK
22-Dec-06	12:21:15	406	98.14	PPM	OK
22-Dec-06	12:21:36	407	324	PPM	OK
22-Dec-06	12:21:54	408	137	PPM	OK
22-Dec-06	12:22:15	409	43.03	PPM	OK
22-Dec-06	12:22:30	410	39.52	PPM	OK
22-Dec-06	12:23:11	411	54.21	PPM	OK
22-Dec-06	12:23:32	412	32.12	PPM	OK
22-Dec-06	12:23:49	413	29.43	PPM	OK
22-Dec-06	12:24:12	414	38.2	PPM	OK
22-Dec-06	12:24:38	415	23.33	PPM	OK
22-Dec-06	12:24:53	416	28.29	PPM	OK
22-Dec-06	12:25:16	417	29.29	PPM	OK
22-Dec-06	12:25:30	418	37.69	PPM	OK
22-Dec-06	12:25:54	419	87.75	PPM	OK
22-Dec-06	12:26:19	420	14.28	PPM	OK
22-Dec-06	12:26:38	421	180	PPM	OK
22-Dec-06	12:27:06	422	28.2	PPM	OK
22-Dec-06	12:27:29	423	5.79	PPM	OK
22-Dec-06	12:27:43	424	6.62	PPM	OK
22-Dec-06	12:28:00	425	7.72	PPM	OK

END

History for Sanford, FL

Friday, December 22, 2006

Daily Summary

	Actual:	Average :	Record :
Temperature:			
Mean Temperature	72 °F / 22 °C	-	
Max Temperature	81 °F / 27 °C	70 °F / 21 °C	83 °F / 28 °C (1956)
Min Temperature	63 °F / 17 °C	48 °F / 8 °C	31 °F / 0 °C (1960)
Cooling Degree Days	7		
Growing Degree Days	22 (Base 50)		
Moisture:			
Dew Point	61 °F / 16 °C		
Average Humidity	78		
Maximum Humidity	94		
Minimum Humidity	56		
Precipitation:			
Precipitation	2.15 in / 5.46 cm	-	- ()
Sea Level Pressure:			
Sea Level Pressure	30.09 in / 1019 hPa		
Wind:			
Wind Speed	3 mph / 5 km/h (South)		
Max Wind Speed	18 mph / 29 km/h		
Max Gust Speed	28 mph / 45 km/h		
Visibility	8 miles / 13 kilometers		
Events	Fog , Rain , Thunderstorm		

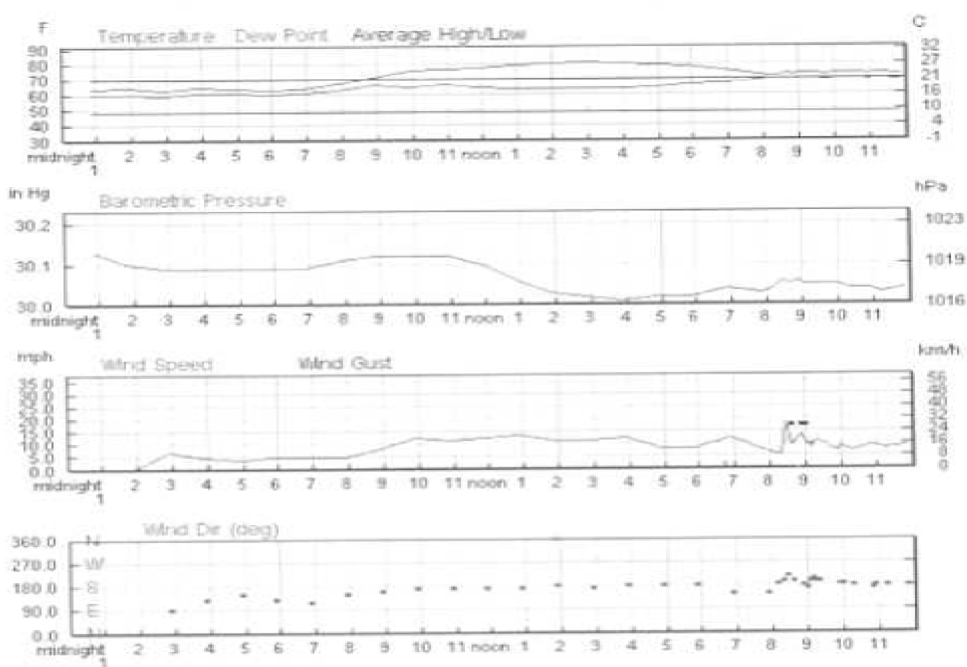
Averages and records for this station are not official NWS values.

Click here for data from the nearest station with official NWS data (KMCO).

T = Trace of Precipitation, **MM** = Missing Value

Source: NWS Daily Summary

Seasonal Weather Averages



Hourly Observations

Time (EST):	Temp.:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
12:53 AM	64.0 °F / 17.8 °C	60.1 °F / 15.6 °C	87%	30.13 in / 1020.1 hPa	7.0 miles / 11.3 kilometers	Calm	Calm	-	N/A		Mostly Cloudy
1:53 AM	64.9 °F / 18.3 °C	60.1 °F / 15.6 °C	84%	30.10 in / 1019.2 hPa	10.0 miles / 16.1 kilometers	Calm	Calm	-	N/A		Clear
2:53 AM	63.0 °F / 17.2 °C	59.0 °F / 15.0 °C	87%	30.09 in / 1019.0 hPa	8.0 miles / 12.9 kilometers	East	6.9 mph / 11.1 km/h / 3.1 m/s	-	N/A		Mostly Cloudy
3:53 AM	64.9 °F / 18.3 °C	61.0 °F / 16.1 °C	87%	30.09 in / 1019.0 hPa	10.0 miles / 16.1 kilometers	SE	4.6 mph / 7.4 km/h / 2.1 m/s	-	N/A		Partly Cloudy
4:53 AM	64.0 °F / 17.8 °C	61.0 °F / 16.1 °C	90%	30.09 in / 1019.0 hPa	8.0 miles / 12.9 kilometers	SSE	3.5 mph / 5.6 km/h / 1.5 m/s	-	N/A		Clear
5:53 AM	63.0 °F / 17.2 °C	60.1 °F / 15.6 °C	90%	30.09 in / 1018.9 hPa	6.0 miles / 9.7 kilometers	SE	4.6 mph / 7.4 km/h / 2.1 m/s	-	N/A		Clear
6:53 AM	64.0 °F / 17.8 °C	61.0 °F / 16.1 °C	90%	30.09 in / 1019.0 hPa	6.0 miles / 9.7 kilometers	ESE	4.6 mph / 7.4 km/h / 2.1 m/s	-	N/A		Scattered Clouds
7:53 AM	66.9 °F / 19.4 °C	63.0 °F / 17.2 °C	87%	30.11 in / 1019.5 hPa	7.0 miles / 11.3 kilometers	SSE	4.6 mph / 7.4 km/h / 2.1 m/s	-	N/A		Mostly Cloudy
8:53 AM	71.1 °F / 21.7 °C	66.0 °F / 18.9 °C	84%	30.12 in / 1019.7 hPa	10.0 miles / 16.1 kilometers	SSE	8.1 mph / 13.0 km/h / 3.6 m/s	-	N/A		Clear
9:53 AM	75.0 °F / 23.9 °C	64.9 °F / 18.3 °C	71%	30.12 in / 1020.0 hPa	10.0 miles / 16.1 kilometers	South	12.7 mph / 20.4 km/h / 5.7 m/s	-	N/A		Overcast
10:53 AM	75.9 °F / 24.4 °C	66.0 °F / 18.9 °C	71%	30.12 in / 1019.7 hPa	10.0 miles / 16.1 kilometers	South	11.5 mph / 18.5 km/h / 5.1 m/s	-	N/A		Scattered Clouds
11:53 AM	77.0 °F / 25.0 °C	64.9 °F / 18.3 °C	66%	30.10 in / 1019.1 hPa	10.0 miles / 16.1 kilometers	South	12.7 mph / 20.4 km/h / 5.7 m/s	-	N/A		Overcast
12:53 PM	79.0 °F / 26.1 °C	64.0 °F / 17.8 °C	60%	30.06 in / 1018.0 hPa	10.0 miles / 16.1 kilometers	South	13.8 mph / 22.2 km/h / 6.2 m/s	-	N/A		Scattered Clouds
1:53 PM	80.1 °F / 26.7 °C	64.0 °F / 17.8 °C	58%	30.03 in / 1016.9 hPa	10.0 miles / 16.1 kilometers	South	11.5 mph / 18.5 km/h / 5.1 m/s	-	N/A		Mostly Cloudy
2:53 PM	81.0 °F / 27.2 °C	64.0 °F / 17.8 °C	56%	30.02 in / 1016.4 hPa	10.0 miles / 16.1 kilometers	South	11.5 mph / 18.5 km/h / 5.1 m/s	-	N/A		Mostly Cloudy
3:53 PM	80.1 °F / 26.7 °C	64.0 °F / 17.8 °C	58%	30.01 in / 1016.3 hPa	10.0 miles / 16.1 kilometers	South	12.7 mph / 20.4 km/h / 5.7 m/s	-	N/A		Mostly Cloudy
4:53 PM	79.0 °F / 26.1 °C	64.9 °F / 18.3 °C	62%	30.02 in / 1016.4 hPa	10.0 miles / 16.1 kilometers	South	8.1 mph / 13.0 km/h / 3.6 m/s	-	N/A		Overcast
5:53 PM	78.1 °F / 25.6 °C	66.0 °F / 18.9 °C	66%	30.02 in / 1016.6 hPa	10.0 miles / 16.1 kilometers	South	8.1 mph / 13.0 km/h / 3.6 m/s	-	N/A		Overcast

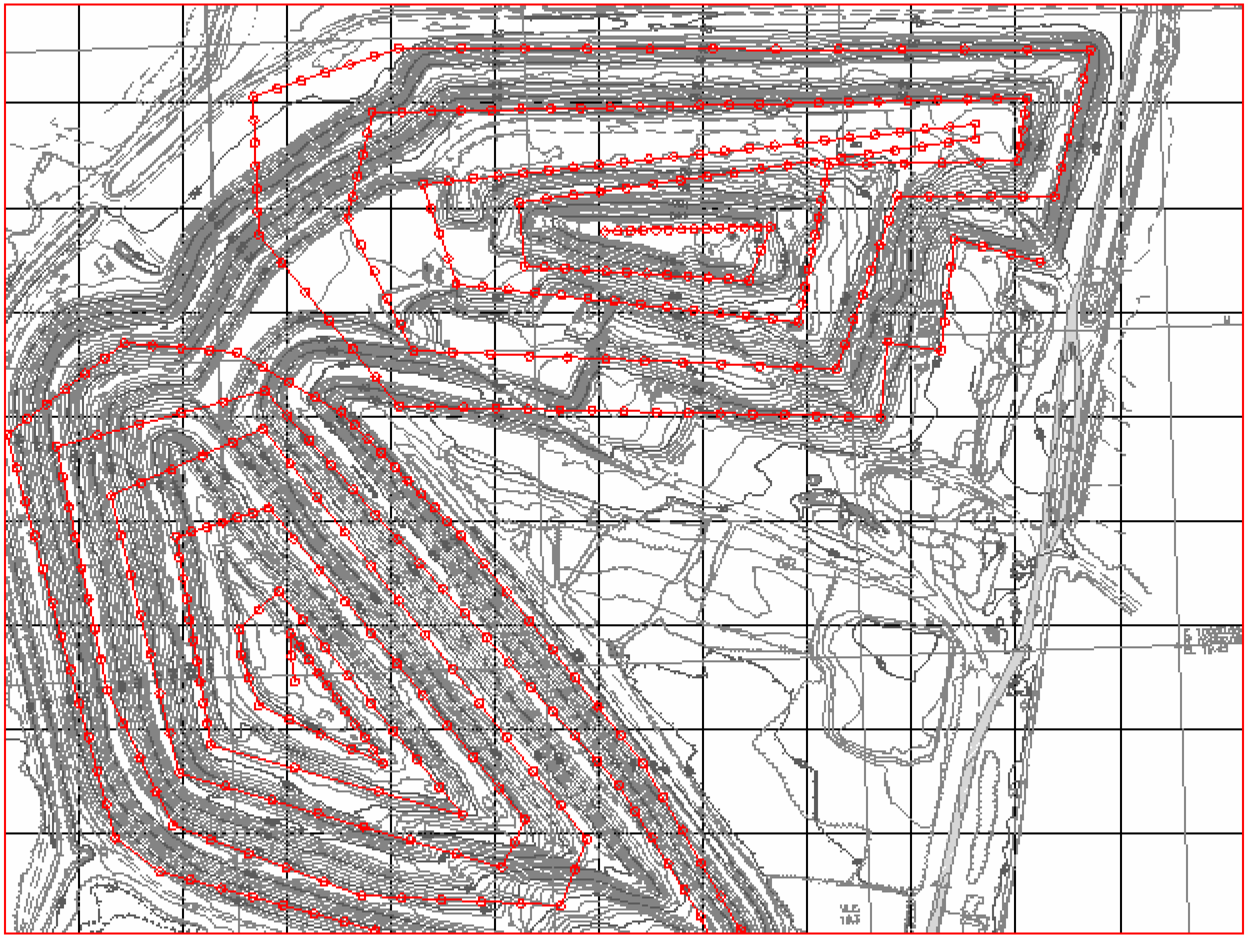


Figure A-1: Seminole County Landfill 4th Quarter 2006 VOC Readings

Environmental Consultants
and Contractors

3012 U.S. Highway 301 North
Suite 700
Tampa, FL 33619-2242

813 630-2109
FAX 813 630-1790
www.scsfieldservices.com

SCS FIELD SERVICES

July 10, 2007
SCS File No. 09206066.02

David Gregory
Solid Waste Director
Seminole County Landfill
1930 E. Osceola Road
Geneva, FL 32773-7499

Subject: Results of Second Quarter 2007 Surface Emissions Monitoring, Seminole County Landfill, Geneva, FL

Dear David:

On June 29, 2007, SCS Field Services (SCS-FS) conducted surface emissions monitoring at the subject location, as specified in 40 CFR 60.755 (c) and (d), and 40 CFR 60, Appendix A, Method 21. These regulations require surface monitoring around the perimeter of and within the LFG Collection System area, the extent of which includes landfill areas where waste exceeds two (2) years in age at final grade or five years in age at interim grades.

Monitoring was completed in accordance with the regulations. A total of 358 points were surveyed for emissions of volatile organic compounds (VOC), as methane, using a Foxboro TVA-1000B flame ionization detector.

Over the area surveyed, no points exceeded 500 ppm above background. As such, no additional monitoring or remedial action was required for this quarter. The monitoring data is attached.

SCS-FS, an employee-owned company, thanks you for using our services. Please contact either of the undersigned if you require further information.

Sincerely,

Michael D. Knox
Project Manager
SCS FIELD SERVICES

Initial of Author/Initials of Reviewer:

Attachments: Calibration Form
Monitoring Data Table

Offices Nationwide

SCS Field Services, Inc.

NSPS Surface Emissions Monitoring
Calibration and Pertinent Data Form

Date: 6/29/07 Site Name: SEMINOLE LF Job Number: 09206066.02 / 02

Technician(s): Jason Beaver

Weather Observations

Wind Speed: 3 MPH Wind Direction: NE Barometric Pressure: 30.01 "Hg

Air Temperature 88° °F General Weather Conditions: Cloudy

Calibration Information

Pre-monitoring Calibration Precision Check

Procedure: Calibrate the instrument. Make a total of three measurements by alternating zero air and the calibration gas. Record the readings and calculate the average algebraic difference between the instrument reading and the calibration gas as a percentage. The calibration precision must be less than or equal to 10% of the calibration gas value.

Instrument ID: TVA1000 Cal Gas Concentration: 500 ppm

Trial	Zero Air Reading	Cal Gas Reading	Cal Gas Conc. – Cal Gas Reading
1	0.89	503	3
2	1.12	502	2
3	1.27	501	1

Average Difference: 2

Calibration Precision = Average Difference/Cal Gas Conc. X 100%
= 2 / 500 X 100%
= .4 %

Post-monitoring Calibration Check

Zero Air Reading: 1.87 ppm Cal Gas Reading 503 ppm

Background Concentration Checks

Upwind Location Description: Road NE corner Reading: 2.45 ppm
Downwind Location Description: Road SW corner Reading: 1.89 ppm

Notes/Comments

No Exceedances

C:\Documents\NSPScalform.doc

8/15/2000
TML

TABLE 1. SEMINOLE COUNTY LANDFILL
NSPS SURFACE EMISSIONS MONITORING DATA
SECOND QUARTER 2007

Date	Time (Hr:Min:Sec)	Monitoring Tag	FID Concentration	Unit	Notes
29-Jun-07	8:27:23	500PPM	503	PPM	OK
29-Jun-07	8:27:44	ZERO GAS	0.89	PPM	OK
29-Jun-07	8:27:52	UPWIND	2.45	PPM	OK
29-Jun-07	8:28:12	DOWN WIND	1.89	PPM	OK
29-Jun-07	8:28:49	1	0.47	PPM	OK
29-Jun-07	8:29:09	2	196	PPM	OK
29-Jun-07	8:29:19	3	94.61	PPM	OK
29-Jun-07	8:29:53	4	17.77	PPM	OK
29-Jun-07	8:30:12	5	108	PPM	OK
29-Jun-07	8:30:32	6	85.68	PPM	OK
29-Jun-07	8:30:52	7	121	PPM	OK
29-Jun-07	8:31:11	8	25.88	PPM	OK
29-Jun-07	8:31:32	9	33.22	PPM	OK
29-Jun-07	8:31:52	10	240	PPM	OK
29-Jun-07	8:32:12	11	75.72	PPM	OK
29-Jun-07	8:32:31	12	32.57	PPM	OK
29-Jun-07	8:32:51	13	15.55	PPM	OK
29-Jun-07	8:33:11	14	40.60	PPM	OK
29-Jun-07	8:33:30	15	76.14	PPM	OK
29-Jun-07	8:33:49	16	5.74	PPM	OK
29-Jun-07	8:34:08	17	107	PPM	OK
29-Jun-07	8:34:27	18	4.67	PPM	OK
29-Jun-07	8:34:46	19	0.70	PPM	OK
29-Jun-07	8:35:06	20	1.55	PPM	OK
29-Jun-07	8:35:25	21	3.32	PPM	OK
29-Jun-07	8:35:44	22	17.00	PPM	OK
29-Jun-07	8:36:03	23	9.41	PPM	OK
29-Jun-07	8:36:36	24	131	PPM	OK
29-Jun-07	8:36:56	25	11.36	PPM	OK
29-Jun-07	8:37:15	26	1.95	PPM	OK
29-Jun-07	8:37:33	27	1.67	PPM	OK
29-Jun-07	8:37:51	28	1.12	PPM	OK
29-Jun-07	8:38:09	29	0.70	PPM	OK
29-Jun-07	8:38:27	30	0.72	PPM	OK
29-Jun-07	8:38:46	31	2.62	PPM	OK
29-Jun-07	8:39:05	32	5.69	PPM	OK
29-Jun-07	8:39:41	33	85.03	PPM	OK
29-Jun-07	8:39:58	34	205	PPM	OK
29-Jun-07	8:40:17	35	252	PPM	OK
29-Jun-07	8:40:35	36	201	PPM	OK
29-Jun-07	8:40:55	37	59.72	PPM	OK
29-Jun-07	8:41:13	38	17.94	PPM	OK
29-Jun-07	8:41:31	39	6.66	PPM	OK
29-Jun-07	8:41:50	40	5.96	PPM	OK
29-Jun-07	8:42:09	41	0.07	PPM	OK

TABLE 1. SEMINOLE COUNTY LANDFILL
NSPS SURFACE EMISSIONS MONITORING DATA
SECOND QUARTER 2007

Date	Time (Hr:Min:Sec)	Monitoring Tag	FID Concentration	Unit	Notes
29-Jun-07	8:42:29	42	22.98	PPM	OK
29-Jun-07	8:42:50	43	0.25	PPM	OK
29-Jun-07	8:43:19	44	0.45	PPM	OK
29-Jun-07	8:43:38	45	0.00	PPM	OK
29-Jun-07	8:43:57	46	0.10	PPM	OK
29-Jun-07	8:44:16	47	10.51	PPM	OK
29-Jun-07	8:44:35	48	28.80	PPM	OK
29-Jun-07	8:44:54	49	22.44	PPM	OK
29-Jun-07	8:45:12	50	35.84	PPM	OK
29-Jun-07	8:45:31	51	13.93	PPM	OK
29-Jun-07	8:45:50	52	21.51	PPM	OK
29-Jun-07	8:46:10	53	46.72	PPM	OK
29-Jun-07	8:46:29	54	116	PPM	OK
29-Jun-07	8:46:48	55	82.13	PPM	OK
29-Jun-07	8:47:08	56	61.87	PPM	OK
29-Jun-07	8:47:26	57	58.10	PPM	OK
29-Jun-07	8:47:45	58	256	PPM	OK
29-Jun-07	8:48:04	59	290	PPM	OK
29-Jun-07	8:48:22	60	334	PPM	OK
29-Jun-07	8:48:42	61	231	PPM	OK
29-Jun-07	8:49:26	62	220	PPM	OK
29-Jun-07	8:49:44	63	183	PPM	OK
29-Jun-07	8:50:03	64	394	PPM	OK
29-Jun-07	8:50:26	65	68.88	PPM	OK
29-Jun-07	8:50:44	66	101	PPM	OK
29-Jun-07	8:51:03	67	171	PPM	OK
29-Jun-07	8:51:22	68	283	PPM	OK
29-Jun-07	8:51:41	69	213	PPM	OK
29-Jun-07	8:52:00	70	124	PPM	OK
29-Jun-07	8:52:19	71	46.29	PPM	OK
29-Jun-07	8:52:38	72	360	PPM	OK
29-Jun-07	8:52:57	73	231	PPM	OK
29-Jun-07	8:53:29	74	139	PPM	OK
29-Jun-07	8:53:51	75	271	PPM	OK
29-Jun-07	8:54:10	76	168	PPM	OK
29-Jun-07	8:54:32	77	28.57	PPM	OK
29-Jun-07	8:54:52	78	68.70	PPM	OK
29-Jun-07	8:55:09	79	37.76	PPM	OK
29-Jun-07	8:55:29	80	76.34	PPM	OK
29-Jun-07	8:55:48	81	105	PPM	OK
29-Jun-07	8:56:08	82	69.75	PPM	OK
29-Jun-07	8:56:29	83	76.04	PPM	OK
29-Jun-07	8:56:49	84	31.97	PPM	OK
29-Jun-07	8:57:11	85	103	PPM	OK
29-Jun-07	8:58:09	86	12.93	PPM	OK

TABLE 1. SEMINOLE COUNTY LANDFILL
NSPS SURFACE EMISSIONS MONITORING DATA
SECOND QUARTER 2007

Date	Time (Hr:Min:Sec)	Monitoring Tag	FID Concentration	Unit	Notes
29-Jun-07	8:58:28	87	31.49	PPM	OK
29-Jun-07	8:58:48	88	9.78	PPM	OK
29-Jun-07	8:59:06	89	4.04	PPM	OK
29-Jun-07	8:59:26	90	2.27	PPM	OK
29-Jun-07	8:59:48	91	11.41	PPM	OK
29-Jun-07	9:00:12	92	19.27	PPM	OK
29-Jun-07	9:00:34	93	4.12	PPM	OK
29-Jun-07	9:00:56	94	17.14	PPM	OK
29-Jun-07	9:01:16	95	14.47	PPM	OK
29-Jun-07	9:01:49	96	53.41	PPM	OK
29-Jun-07	9:02:10	97	47.12	PPM	OK
29-Jun-07	9:02:31	98	22.54	PPM	OK
29-Jun-07	9:02:50	99	147	PPM	OK
29-Jun-07	9:03:10	100	52.06	PPM	OK
29-Jun-07	9:03:31	101	119	PPM	OK
29-Jun-07	9:03:52	102	137	PPM	OK
29-Jun-07	9:04:11	103	194	PPM	OK
29-Jun-07	9:04:32	104	73.12	PPM	OK
29-Jun-07	9:04:53	105	33.94	PPM	OK
29-Jun-07	9:05:13	106	15.62	PPM	OK
29-Jun-07	9:05:34	107	197	PPM	OK
29-Jun-07	9:05:53	108	80.38	PPM	OK
29-Jun-07	9:06:14	109	41.48	PPM	OK
29-Jun-07	9:06:34	110	16.15	PPM	OK
29-Jun-07	9:06:53	111	17.84	PPM	OK
29-Jun-07	9:07:13	112	10.21	PPM	OK
29-Jun-07	9:07:33	113	10.41	PPM	OK
29-Jun-07	9:07:52	114	8.31	PPM	OK
29-Jun-07	9:08:11	115	7.36	PPM	OK
29-Jun-07	9:08:29	116	2.35	PPM	OK
29-Jun-07	9:18:25	117	21.36	PPM	OK
29-Jun-07	9:18:47	118	18.87	PPM	OK
29-Jun-07	9:19:05	119	31.64	PPM	OK
29-Jun-07	9:19:22	120	72.82	PPM	OK
29-Jun-07	9:19:34	121	97.95	PPM	OK
29-Jun-07	9:19:47	122	76.94	PPM	OK
29-Jun-07	9:20:03	123	106	PPM	OK
29-Jun-07	9:20:21	124	74.64	PPM	OK
29-Jun-07	9:20:39	125	14.18	PPM	OK
29-Jun-07	9:20:57	126	125	PPM	OK
29-Jun-07	9:21:14	127	60.19	PPM	OK
29-Jun-07	9:21:32	128	134	PPM	OK
29-Jun-07	9:21:49	129	45.45	PPM	OK
29-Jun-07	9:22:07	130	127	PPM	OK
29-Jun-07	9:22:26	131	127	PPM	OK

TABLE I. SEMINOLE COUNTY LANDFILL
NSPS SURFACE EMISSIONS MONITORING DATA
SECOND QUARTER 2007

Date	Time (Hr:Min:Sec)	Monitoring Tag	FID Concentration	Unit	Notes
29-Jun-07	9:22:46	132	11.08	PPM	OK
29-Jun-07	9:23:06	133	8.78	PPM	OK
29-Jun-07	9:24:13	134	12.23	PPM	OK
29-Jun-07	9:24:33	135	4.89	PPM	OK
29-Jun-07	9:24:52	136	5.91	PPM	OK
29-Jun-07	9:25:28	137	11.95	PPM	OK
29-Jun-07	9:26:09	138	8.66	PPM	OK
29-Jun-07	9:26:28	139	14.87	PPM	OK
29-Jun-07	9:26:49	140	28.85	PPM	OK
29-Jun-07	9:27:08	141	48.74	PPM	OK
29-Jun-07	9:27:28	142	28.92	PPM	OK
29-Jun-07	9:27:48	143	45.67	PPM	OK
29-Jun-07	9:28:07	144	12.68	PPM	OK
29-Jun-07	9:28:27	145	93.44	PPM	OK
29-Jun-07	9:29:12	146	24.21	PPM	OK
29-Jun-07	9:29:30	147	14.95	PPM	OK
29-Jun-07	9:29:47	148	86.60	PPM	OK
29-Jun-07	9:30:08	149	25.48	PPM	OK
29-Jun-07	9:30:33	150	33.94	PPM	OK
29-Jun-07	9:30:52	151	60.14	PPM	OK
29-Jun-07	9:31:11	152	21.11	PPM	OK
29-Jun-07	9:31:30	153	27.10	PPM	OK
29-Jun-07	9:31:48	154	20.96	PPM	OK
29-Jun-07	9:32:06	155	37.33	PPM	OK
29-Jun-07	9:32:24	156	55.13	PPM	OK
29-Jun-07	9:32:43	157	71.85	PPM	OK
29-Jun-07	9:33:02	158	86.67	PPM	OK
29-Jun-07	9:33:21	159	88.10	PPM	OK
29-Jun-07	9:34:10	160	17.99	PPM	OK
29-Jun-07	9:34:26	161	49.79	PPM	OK
29-Jun-07	9:34:45	162	25.26	PPM	OK
29-Jun-07	9:35:03	163	143	PPM	OK
29-Jun-07	9:35:21	164	30.65	PPM	OK
29-Jun-07	9:35:38	165	21.74	PPM	OK
29-Jun-07	9:35:57	166	7.86	PPM	OK
29-Jun-07	9:36:15	167	14.30	PPM	OK
29-Jun-07	9:36:30	168	37.01	PPM	OK
29-Jun-07	9:36:49	169	11.43	PPM	OK
29-Jun-07	9:37:09	170	7.66	PPM	OK
29-Jun-07	9:37:33	171	24.28	PPM	OK
29-Jun-07	9:37:56	172	8.88	PPM	OK
29-Jun-07	9:38:14	173	54.35	PPM	OK
29-Jun-07	9:38:32	174	62.34	PPM	OK
29-Jun-07	9:38:50	175	23.58	PPM	OK
29-Jun-07	9:39:09	176	51.61	PPM	OK

TABLE 1. SEMINOLE COUNTY LANDFILL
NSPS SURFACE EMISSIONS MONITORING DATA
SECOND QUARTER 2007

Date	Time (Hr:Min:Sec)	Monitoring Tag	FID Concentration	Unit	Notes
29-Jun-07	9:39:29	177	28.90	PPM	OK
29-Jun-07	9:39:47	178	16.87	PPM	OK
29-Jun-07	9:40:05	179	41.15	PPM	OK
29-Jun-07	9:40:23	180	29.57	PPM	OK
29-Jun-07	9:40:38	181	46.52	PPM	OK
29-Jun-07	9:41:00	182	33.02	PPM	OK
29-Jun-07	9:41:19	183	40.45	PPM	OK
29-Jun-07	9:41:36	184	37.18	PPM	OK
29-Jun-07	9:42:25	185	30.45	PPM	OK
29-Jun-07	9:43:17	186	22.56	PPM	OK
29-Jun-07	9:50:37	187	11.31	PPM	OK
29-Jun-07	9:50:59	188	14.55	PPM	OK
29-Jun-07	9:51:16	189	7.46	PPM	OK
29-Jun-07	9:51:35	190	9.18	PPM	OK
29-Jun-07	9:51:54	191	8.93	PPM	OK
29-Jun-07	9:52:12	192	22.24	PPM	OK
29-Jun-07	9:52:31	193	16.27	PPM	OK
29-Jun-07	9:52:49	194	9.93	PPM	OK
29-Jun-07	9:53:07	195	9.01	PPM	OK
29-Jun-07	9:53:26	196	10.16	PPM	OK
29-Jun-07	9:53:45	197	7.86	PPM	OK
29-Jun-07	9:54:03	198	9.33	PPM	OK
29-Jun-07	9:54:21	199	7.36	PPM	OK
29-Jun-07	9:54:40	200	9.01	PPM	OK
29-Jun-07	9:54:58	201	15.07	PPM	OK
29-Jun-07	9:55:17	202	15.45	PPM	OK
29-Jun-07	9:55:36	203	14.72	PPM	OK
29-Jun-07	9:55:56	204	12.95	PPM	OK
29-Jun-07	9:56:16	205	12.70	PPM	OK
29-Jun-07	9:56:35	206	11.08	PPM	OK
29-Jun-07	9:56:55	207	12.53	PPM	OK
29-Jun-07	9:57:14	208	12.98	PPM	OK
29-Jun-07	9:57:35	209	19.29	PPM	OK
29-Jun-07	9:57:55	210	13.95	PPM	OK
29-Jun-07	9:58:15	211	11.58	PPM	OK
29-Jun-07	9:58:34	212	33.67	PPM	OK
29-Jun-07	9:58:54	213	65.24	PPM	OK
29-Jun-07	9:59:13	214	47.57	PPM	OK
29-Jun-07	9:59:34	215	21.64	PPM	OK
29-Jun-07	9:59:52	216	19.87	PPM	OK
29-Jun-07	10:00:11	217	14.52	PPM	OK
29-Jun-07	10:00:31	218	16.87	PPM	OK
29-Jun-07	10:00:49	219	14.90	PPM	OK
29-Jun-07	10:01:01	220	29.52	PPM	OK
29-Jun-07	10:01:33	221	277	PPM	OK

TABLE 1. SEMINOLE COUNTY LANDFILL
NSPS SURFACE EMISSIONS MONITORING DATA
SECOND QUARTER 2007

Date	Time (Hr:Min:Sec)	Monitoring Tag	FID Concentration	Unit	Notes
29-Jun-07	10:02:00	222	14.42	PPM	OK
29-Jun-07	10:02:32	223	16.37	PPM	OK
29-Jun-07	10:03:50	224	10.61	PPM	OK
29-Jun-07	10:04:48	225	14.62	PPM	OK
29-Jun-07	10:05:30	226	15.35	PPM	OK
29-Jun-07	10:07:16	227	12.80	PPM	OK
29-Jun-07	10:08:06	228	13.20	PPM	OK
29-Jun-07	10:08:30	229	14.28	PPM	OK
29-Jun-07	10:08:47	230	9.53	PPM	OK
29-Jun-07	10:09:06	231	11.63	PPM	OK
29-Jun-07	10:09:29	232	11.06	PPM	OK
29-Jun-07	10:09:51	233	6.54	PPM	OK
29-Jun-07	10:10:39	234	9.11	PPM	OK
29-Jun-07	10:10:58	235	9.63	PPM	OK
29-Jun-07	10:11:20	236	6.69	PPM	OK
29-Jun-07	10:11:39	237	6.26	PPM	OK
29-Jun-07	10:13:09	238	23.11	PPM	OK
29-Jun-07	10:13:28	239	26.43	PPM	OK
29-Jun-07	10:14:16	240	32.74	PPM	OK
29-Jun-07	10:15:16	241	35.26	PPM	OK
29-Jun-07	10:15:38	242	29.85	PPM	OK
29-Jun-07	10:15:57	243	31.32	PPM	OK
29-Jun-07	10:16:47	244	29.95	PPM	OK
29-Jun-07	10:17:19	245	17.47	PPM	OK
29-Jun-07	10:17:39	246	15.05	PPM	OK
29-Jun-07	10:17:58	247	15.72	PPM	OK
29-Jun-07	10:18:17	248	14.55	PPM	OK
29-Jun-07	10:18:36	249	13.05	PPM	OK
29-Jun-07	10:19:13	250	156	PPM	OK
29-Jun-07	10:19:35	251	12.98	PPM	OK
29-Jun-07	10:19:54	252	7.36	PPM	OK
29-Jun-07	10:20:20	253	10.33	PPM	OK
29-Jun-07	10:20:38	254	13.05	PPM	OK
29-Jun-07	10:20:57	255	5.17	PPM	OK
29-Jun-07	10:21:17	256	6.21	PPM	OK
29-Jun-07	10:21:35	257	5.64	PPM	OK
29-Jun-07	10:21:54	258	7.31	PPM	OK
29-Jun-07	10:22:13	259	5.17	PPM	OK
29-Jun-07	10:22:31	260	6.69	PPM	OK
29-Jun-07	10:22:50	261	3.42	PPM	OK
29-Jun-07	10:23:08	262	4.94	PPM	OK
29-Jun-07	10:23:25	263	3.77	PPM	OK
29-Jun-07	10:23:43	264	4.54	PPM	OK
29-Jun-07	10:24:02	265	4.54	PPM	OK
29-Jun-07	10:24:20	266	5.84	PPM	OK

TABLE 1. SEMINOLE COUNTY LANDFILL
NSPS SURFACE EMISSIONS MONITORING DATA
SECOND QUARTER 2007

Date	Time (Hr:Min:Sec)	Monitoring Tag	FID Concentration	Unit	Notes
29-Jun-07	10:24:38	267	4.39	PPM	OK
29-Jun-07	10:24:56	268	20.01	PPM	OK
29-Jun-07	10:25:15	269	12.78	PPM	OK
29-Jun-07	10:25:32	270	6.56	PPM	OK
29-Jun-07	10:25:50	271	7.14	PPM	OK
29-Jun-07	10:26:07	272	5.32	PPM	OK
29-Jun-07	10:26:24	273	5.71	PPM	OK
29-Jun-07	10:26:43	274	14.72	PPM	OK
29-Jun-07	10:27:01	275	10.51	PPM	OK
29-Jun-07	10:27:19	276	13.65	PPM	OK
29-Jun-07	10:27:37	277	14.85	PPM	OK
29-Jun-07	10:27:53	278	14.95	PPM	OK
29-Jun-07	10:28:13	279	19.94	PPM	OK
29-Jun-07	10:28:32	280	30.52	PPM	OK
29-Jun-07	10:28:50	281	62.69	PPM	OK
29-Jun-07	10:29:09	282	61.89	PPM	OK
29-Jun-07	10:29:28	283	20.76	PPM	OK
29-Jun-07	10:29:47	284	11.93	PPM	OK
29-Jun-07	10:30:09	285	7.04	PPM	OK
29-Jun-07	10:30:45	286	7.56	PPM	OK
29-Jun-07	10:31:08	287	18.34	PPM	OK
29-Jun-07	10:31:28	288	8.29	PPM	OK
29-Jun-07	10:31:47	289	7.89	PPM	OK
29-Jun-07	10:32:07	290	7.21	PPM	OK
29-Jun-07	10:32:27	291	6.14	PPM	OK
29-Jun-07	10:32:47	292	5.69	PPM	OK
29-Jun-07	10:33:07	293	5.27	PPM	OK
29-Jun-07	10:33:26	294	7.96	PPM	OK
29-Jun-07	10:33:45	295	4.29	PPM	OK
29-Jun-07	10:34:04	296	10.88	PPM	OK
29-Jun-07	10:34:22	297	6.01	PPM	OK
29-Jun-07	10:34:40	298	8.83	PPM	OK
29-Jun-07	10:34:58	299	5.27	PPM	OK
29-Jun-07	10:35:17	300	6.34	PPM	OK
29-Jun-07	10:35:38	301	6.34	PPM	OK
29-Jun-07	10:35:59	302	5.09	PPM	OK
29-Jun-07	10:36:18	303	4.92	PPM	OK
29-Jun-07	10:36:37	304	6.16	PPM	OK
29-Jun-07	10:36:57	305	5.42	PPM	OK
29-Jun-07	10:37:16	306	4.39	PPM	OK
29-Jun-07	10:37:36	307	6.14	PPM	OK
29-Jun-07	10:37:55	308	5.27	PPM	OK
29-Jun-07	10:38:14	309	6.81	PPM	OK
29-Jun-07	10:38:33	310	7.49	PPM	OK
29-Jun-07	10:38:52	311	8.91	PPM	OK

TABLE 1. SEMINOLE COUNTY LANDFILL
NSPS SURFACE EMISSIONS MONITORING DATA
SECOND QUARTER 2007

Date	Time (Hr:Min:Sec)	Monitoring Tag	FID Concentration	Unit	Notes
29-Jun-07	10:39:11	312	8.96	PPM	OK
29-Jun-07	10:39:29	313	6.64	PPM	OK
29-Jun-07	10:39:46	314	7.64	PPM	OK
29-Jun-07	10:40:05	315	7.01	PPM	OK
29-Jun-07	10:40:22	316	5.96	PPM	OK
29-Jun-07	10:40:40	317	5.81	PPM	OK
29-Jun-07	10:40:58	318	6.29	PPM	OK
29-Jun-07	10:41:15	319	4.67	PPM	OK
29-Jun-07	10:41:33	320	5.69	PPM	OK
29-Jun-07	10:41:51	321	5.79	PPM	OK
29-Jun-07	10:42:08	322	6.04	PPM	OK
29-Jun-07	10:42:26	323	6.14	PPM	OK
29-Jun-07	10:42:44	324	8.04	PPM	OK
29-Jun-07	10:43:02	325	7.94	PPM	OK
29-Jun-07	10:43:22	326	9.21	PPM	OK
29-Jun-07	10:43:43	327	9.43	PPM	OK
29-Jun-07	10:44:05	328	17.99	PPM	OK
29-Jun-07	10:44:24	329	11.11	PPM	OK
29-Jun-07	10:44:44	330	8.51	PPM	OK
29-Jun-07	10:45:03	331	5.99	PPM	OK
29-Jun-07	10:45:21	332	11.98	PPM	OK
29-Jun-07	10:45:39	333	8.63	PPM	OK
29-Jun-07	10:45:57	334	13.40	PPM	OK
29-Jun-07	10:46:15	335	14.60	PPM	OK
29-Jun-07	10:46:30	336	12.68	PPM	OK
29-Jun-07	10:46:50	337	9.91	PPM	OK
29-Jun-07	10:47:07	338	10.43	PPM	OK
29-Jun-07	10:47:24	339	9.61	PPM	OK
29-Jun-07	10:47:44	340	8.98	PPM	OK
29-Jun-07	10:48:11	341	9.66	PPM	OK
29-Jun-07	10:48:36	342	11.13	PPM	OK
29-Jun-07	10:48:57	343	8.91	PPM	OK
29-Jun-07	10:49:17	344	16.67	PPM	OK
29-Jun-07	10:49:35	345	16.00	PPM	OK
29-Jun-07	10:49:52	346	12.98	PPM	OK
29-Jun-07	10:50:14	347	18.12	PPM	OK
29-Jun-07	10:50:33	348	10.23	PPM	OK
29-Jun-07	10:50:54	349	18.27	PPM	OK
29-Jun-07	10:51:20	350	16.67	PPM	OK
29-Jun-07	10:51:41	351	7.26	PPM	OK
29-Jun-07	10:52:02	352	7.31	PPM	OK
29-Jun-07	10:52:25	353	25.93	PPM	OK
29-Jun-07	10:52:43	354	13.73	PPM	OK
29-Jun-07	10:53:02	355	13.23	PPM	OK
29-Jun-07	10:53:21	356	23.03	PPM	OK

TABLE 1. SEMINOLE COUNTY LANDFILL
NSPS SURFACE EMISSIONS MONITORING DATA
SECOND QUARTER 2007

Date	Time (Hr:Min:Sec)	Monitoring Tag	FID Concentration	Unit	Notes
29-Jun-07	10:53:44	357	11.08	PPM	OK
29-Jun-07	10:54:02	358	10.46	PPM	OK

History for Sanford, FL

Friday, June 29, 2007

Daily Summary

	Actual:	Average :	Record :
Temperature:			
Mean Temperature	80 °F / 26 °C	-	
Max Temperature	88 °F / 31 °C	90 °F / 32 °C	98 °F / 36 °C (1959)
Min Temperature	73 °F / 22 °C	70 °F / 21 °C	66 °F / 18 °C (1981)
Cooling Degree Days	15		
Growing Degree Days	30 (Base 50)		
Moisture:			
Dew Point	69 °F / 20 °C		
Average Humidity	76		
Maximum Humidity	90		
Minimum Humidity	55		
Precipitation:			
Precipitation	0.13 in / 0.33 cm	-	- ()
Sea Level Pressure:			
Sea Level Pressure	30.05 in / 1017 hPa		
Wind:			
Wind Speed	3 mph / 5 km/h (ESE)		
Max Wind Speed	22 mph / 35 km/h		
Max Gust Speed	25 mph / 40 km/h		
Visibility	9 miles / 15 kilometers		
Events	Rain		

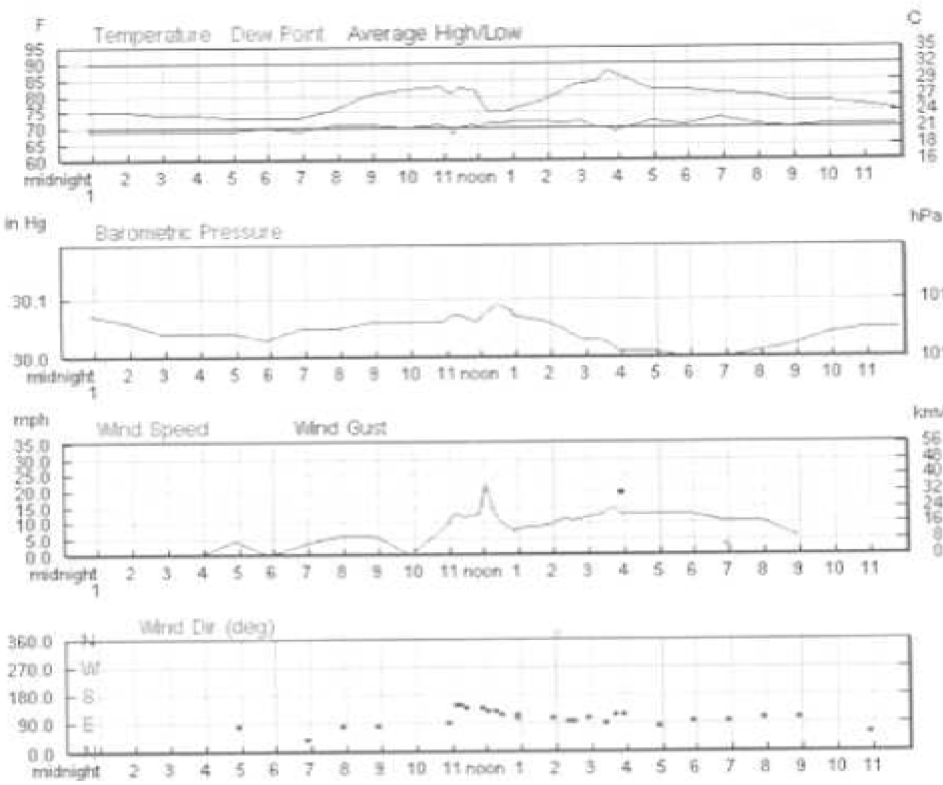
Averages and records for this station are not official NWS values.

Click here for data from the nearest station with official NWS data (KMCO)

T = Trace of Precipitation, **MM** = Missing Value

Source: NWS Daily Summary

Seasonal Weather Averages



Hourly Observations

Time (EDT):	Temp.:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions:
12:53 AM	75.0 °F / 23.9 °C	69.1 °F / 20.6 °C	82%	30.07 in / 1018.3 hPa	10.0 miles / 16.1 kilometers	North	-	-	N/A		Clear
1:53 AM	75.0 °F / 23.9 °C	69.1 °F / 20.6 °C	82%	30.06 in / 1017.7 hPa	10.0 miles / 16.1 kilometers	Calm	Calm	-	N/A		Clear
2:53 AM	73.9 °F / 23.3 °C	69.1 °F / 20.6 °C	85%	30.04 in / 1017.1 hPa	10.0 miles / 16.1 kilometers	Calm	Calm	-	N/A		Partly Cloudy
3:53 AM	73.9 °F / 23.3 °C	69.1 °F / 20.6 °C	85%	30.04 in / 1017.0 hPa	10.0 miles / 16.1 kilometers	Calm	Calm	-	N/A		Clear
4:53 AM	73.0 °F / 22.8 °C	69.1 °F / 20.6 °C	87%	30.04 in / 1017.0 hPa	10.0 miles / 16.1 kilometers	East	4.6 mph / 7.4 km/h / 2.1 m/s	-	N/A		Clear
5:53 AM	73.0 °F / 22.8 °C	70.0 °F / 21.1 °C	90%	30.03 in / 1016.9 hPa	10.0 miles / 16.1 kilometers	Calm	Calm	-	N/A		Clear
6:53 AM	73.0 °F / 22.8 °C	69.1 °F / 20.6 °C	87%	30.05 in / 1017.4 hPa	10.0 miles / 16.1 kilometers	NE	3.5 mph / 5.6 km/h / 1.5 m/s	-	N/A		Scattered Clouds
7:53 AM	75.9 °F / 24.4 °C	71.1 °F / 21.7 °C	85%	30.05 in / 1017.6 hPa	10.0 miles / 16.1 kilometers	East	5.8 mph / 9.3 km/h / 2.6 m/s	-	N/A		Clear
8:53 AM	80.1 °F / 26.7 °C	71.1 °F / 21.7 °C	74%	30.06 in / 1017.9 hPa	10.0 miles / 16.1 kilometers	East	5.8 mph / 9.3 km/h / 2.6 m/s	-	N/A		Partly Cloudy
9:53 AM	82.0 °F / 27.8 °C	70.0 °F / 21.1 °C	67%	30.06 in / 1017.9 hPa	10.0 miles / 16.1 kilometers	Calm	Calm	-	N/A		Mostly Cloudy
10:53 AM	82.9 °F / 28.3 °C	71.1 °F / 21.7 °C	67%	30.06 in / 1017.9 hPa	10.0 miles / 16.1 kilometers	East	9.2 mph / 14.8 km/h / 4.1 m/s	-	N/A		Scattered Clouds
11:09 AM	80.6 °F / 27.0 °C	69.8 °F / 21.0 °C	70%	30.07 in / 1018.2 hPa	10.0 miles / 16.1 kilometers	SSE	12.7 mph / 20.4 km/h / 5.7 m/s	-	N/A		Mostly Cloudy
11:16 AM	80.6 °F / 27.0 °C	68.0 °F / 20.0 °C	65%	30.07 in / 1018.2 hPa	10.0 miles / 16.1 kilometers	SSE	12.7 mph / 20.4 km/h / 5.7 m/s	-	N/A		Overcast
11:23 AM	82.4 °F / 28.0 °C	69.8 °F / 21.0 °C	66%	30.07 in / 1018.2 hPa	10.0 miles / 16.1 kilometers	SE	11.5 mph / 18.5 km/h / 5.1 m/s	-	N/A		Overcast
11:53 AM	82.0 °F / 27.8 °C	71.1 °F / 21.7 °C	69%	30.06 in / 1018.0 hPa	10.0 miles / 16.1 kilometers	SE	12.7 mph / 20.4 km/h / 5.7 m/s	-	N/A		Scattered Clouds
12:03 PM	78.8 °F / 26.0 °C	69.8 °F / 21.0 °C	74%	30.07 in / 1018.2 hPa	10.0 miles / 16.1 kilometers	SE	21.9 mph / 35.2 km/h / 9.8 m/s	25.3 mph / 40.7 km/h / 11.3 m/s	N/A		Mostly Cloudy
12:14 PM	75.2 °F / 24.0 °C	71.6 °F / 22.0 °C	89%	30.08 in / 1018.5 hPa	1.8 miles / 2.8 kilometers	SE	13.8 mph / 22.2 km/h / 6.2 m/s	-	0.07 in / 0.2 cm	Rain	Heavy Rain
12:26 PM	75.2 °F / 24.0 °C	71.6 °F / 22.0 °C	89%	30.09 in / 1018.8 hPa	3.0 miles / 4.8 kilometers	ESE	10.4 mph / 16.7 km/h / 4.6 m/s	-	0.12 in / 0.3 cm	Rain	Light Rain
12:51 PM	75.2 °F / 24.0 °C	71.6 °F / 22.0 °C	89%	30.08 in / 1018.5 hPa	10.0 miles / 16.1 kilometers	ESE	6.9 mph / 11.1 km/h / 3.1 m/s	-	0.12 in / 0.3 cm	Rain	Light Rain
12:53 PM	75.9 °F / 24.4 °C	72.0 °F / 22.2 °C	87%	30.07 in / 1018.3 hPa	10.0 miles / 16.1 kilometers	ESE	8.1 mph / 13.0 km/h / 3.6 m/s	-	0.12 in / 0.3 cm	Rain	Light Rain
1:53 PM	79.0 °F / 26.1 °C	72.0 °F / 22.2 °C	79%	30.06 in / 1017.7 hPa	10.0 miles / 16.1 kilometers	ESE	9.2 mph / 14.8 km/h / 4.1 m/s	-	0.01 in / 0.0 cm		Partly Cloudy
2:18 PM	80.6 °F / 27.0 °C	71.6 °F / 22.0 °C	74%	30.05 in / 1017.5 hPa	10.0 miles / 16.1 kilometers	East	11.5 mph / 18.5 km/h / 5.1 m/s	-	N/A		Mostly Cloudy
2:30 PM	82.4 °F / 28.0 °C	71.6 °F / 22.0 °C	70%	30.04 in / 1017.2 hPa	10.0 miles / 16.1 kilometers	East	10.4 mph / 16.7 km/h / 4.6 m/s	-	N/A		Scattered Clouds
2:53 PM	84.0 °F / 28.9 °C	72.0 °F / 22.2 °C	67%	30.03 in / 1016.9 hPa	10.0 miles / 16.1 kilometers	ESE	11.5 mph / 18.5 km/h / 5.1 m/s	-	N/A		Scattered Clouds
3:24 PM	84.2 °F / 29.0 °C	69.8 °F / 21.0 °C	62%	30.03 in / 1016.8 hPa	10.0 miles / 16.1 kilometers	East	12.7 mph / 20.4 km/h / 5.7 m/s	-	N/A		Mostly Cloudy
3:41 PM	87.8 °F / 31.0 °C	69.8 °F / 21.0 °C	55%	30.02 in / 1016.5 hPa	10.0 miles / 16.1 kilometers	ESE	15.0 mph / 24.1 km/h / 6.7 m/s	19.6 mph / 31.5 km/h / 8.7 m/s	N/A		Scattered Clouds
3:53 PM	87.1 °F / 30.6 °C	69.1 °F / 20.6 °C	55%	30.01 in / 1016.3 hPa	10.0 miles / 16.1 kilometers	ESE	12.7 mph / 20.4 km/h / 5.7 m/s	19.6 mph / 31.5 km/h / 8.7 m/s	N/A		Scattered Clouds

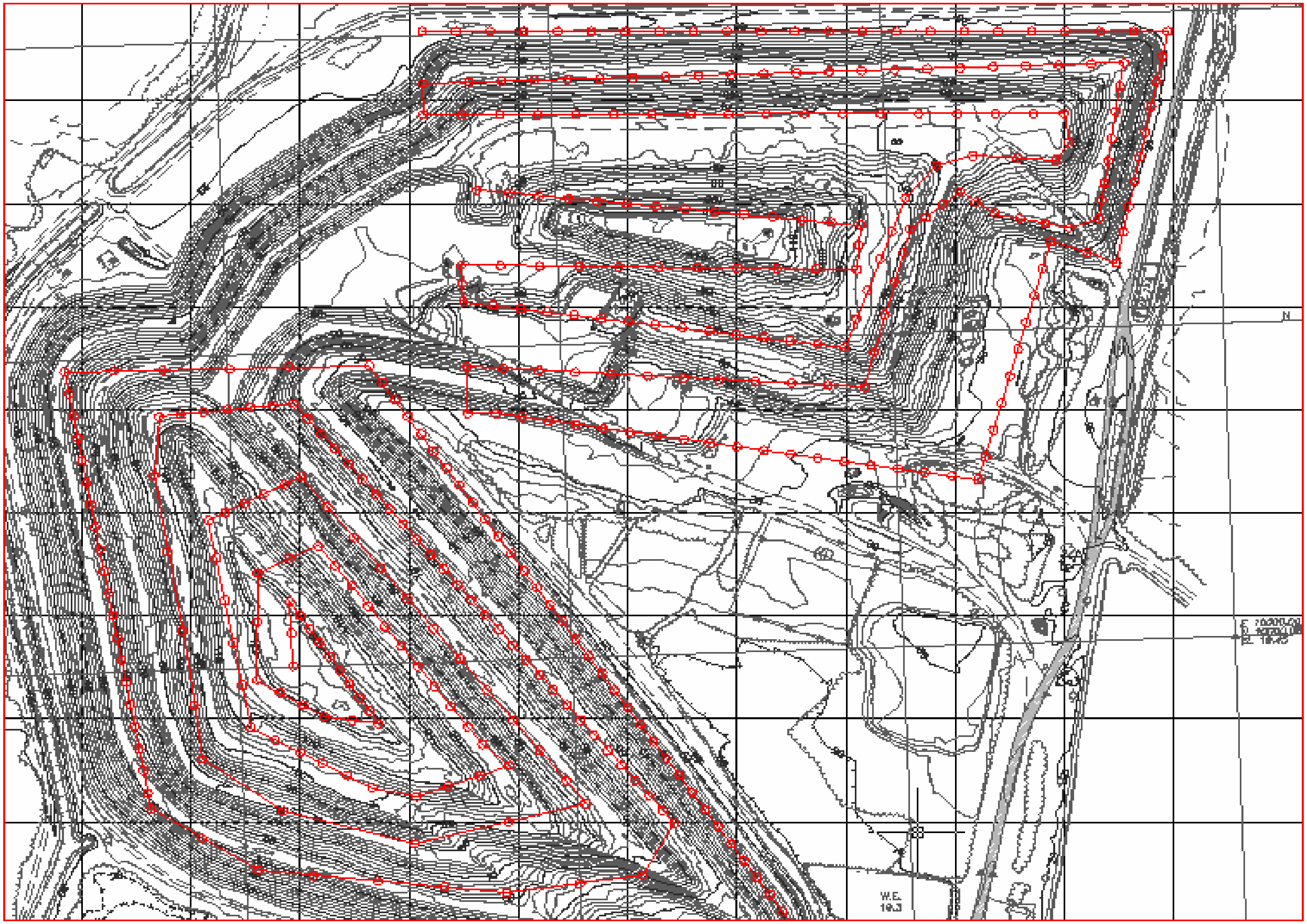


Figure A-2: Seminole County Landfill 2nd Quarter 2007 VOC Reading Locations

July 10, 2008
SCS File No. 09206066.09

Johnny Edwards
Solid Waste Manager
Seminole County Landfill
1930 E. Osceola Road
Geneva, FL 32773-7499

Subject: Results of Second Quarter 2008 Surface Emissions Monitoring, Seminole County Landfill, Geneva, FL

Dear Johnny:

On June 26, 2008, SCS Field Services (SCS-FS) conducted surface emissions monitoring (SEM) at the subject location, as specified in 40 CFR 60.755 (c) and (d), and 40 CFR 60, Appendix A, Method 21.

Monitoring was completed in accordance with the regulations. A total of 442 points were surveyed for emissions of volatile organic compounds (VOC), as methane, using a Foxboro TVA-1000B flame ionization detector.

The monitoring data are presented in Table 1. The monitoring route was determined in the field by SCS-FS. The Calibration and Pertinent Data Forms are also attached. During monitoring the TVA-1000 did not record all of the monitoring points. There is no logged information for readings 222 thru 244. The readings for these locations were manually observed as being below 500 ppm. All points with readings 500 ppm above background were recorded on the route map. There were no readings that were recorded at 500 ppm above background for locations 222 thru 244.

OBSERVATIONS
Over the area surveyed, five monitoring points (Tag numbers 38, 61, 73, 77, 212) had emissions above 500 ppm VOCs. Remedial action was done by increasing vacuum to the wells that were closest to the exceedance areas. Each of these exceedances passed the 10-day recheck with readings below 500 ppm. Per the regulations, these locations will need to be rechecked one month from June 26, 2008, the date of the original exceedances.

SCS-FS, an employee-owned company, thanks you for using our services. Please contact either of the undersigned if you require further information.

Sincerely,

Jason Bever
Senior Field Technician
SCS FIELD SERVICES

Michael D. Knox
Project Manager
SCS FIELD SERVICES

Attachments: Calibration Form
Monitoring Data Table

TABLE 1. SEMINOLE COUNTY LANDFILL
NSPS SURFACE EMISSIONS MONITORING DATA
SECOND QUARTER 2008

Date	Time (Hr:Min:Sec)	Monitoring Tag	FID Concentration	Unit	Notes
26-Jun-08	10:00:00	500PPM	502	PPM	Calibration gas-500 ppm methane
26-Jun-08	10:03:00	ZERO GAS	0.18	PPM	Calibration gas-zero grade air
26-Jun-08	10:09:00	UPWIND	1.82	PPM	East side of Landfill
26-Jun-08	10:12:00	DOWN WIND	3.44	PPM	West side of Landfill
26-Jun-08	10:17:50	1	3.49	PPM	OK
26-Jun-08	10:18:11	2	3.80	PPM	OK
26-Jun-08	10:18:30	3	15.95	PPM	OK
26-Jun-08	10:18:50	4	20.68	PPM	OK
26-Jun-08	10:19:27	5	12.85	PPM	OK
26-Jun-08	10:20:27	6	7.46	PPM	OK
26-Jun-08	10:20:47	7	14.60	PPM	OK
26-Jun-08	10:21:06	8	9.67	PPM	OK
26-Jun-08	10:21:24	9	27.69	PPM	OK
26-Jun-08	10:21:42	10	31.16	PPM	OK
26-Jun-08	10:22:59	11	22.43	PPM	OK
26-Jun-08	10:23:31	12	2.03	PPM	OK
26-Jun-08	10:23:47	13	3.62	PPM	OK
26-Jun-08	10:24:04	14	2.40	PPM	OK
26-Jun-08	10:24:22	15	8.02	PPM	OK
26-Jun-08	10:24:39	16	7.54	PPM	OK
26-Jun-08	10:24:57	17	8.81	PPM	OK
26-Jun-08	10:25:14	18	2.05	PPM	OK
26-Jun-08	10:25:31	19	11.83	PPM	OK
26-Jun-08	10:25:49	20	7.24	PPM	OK
26-Jun-08	10:26:07	21	1.38	PPM	OK
26-Jun-08	10:26:24	22	2.99	PPM	OK
26-Jun-08	10:26:41	23	5.30	PPM	OK
26-Jun-08	10:26:59	24	2.66	PPM	OK
26-Jun-08	10:27:18	25	3.20	PPM	OK
26-Jun-08	10:27:40	26	14.69	PPM	OK
26-Jun-08	10:28:15	27	22.13	PPM	OK
26-Jun-08	10:28:33	28	7.61	PPM	OK
26-Jun-08	10:28:52	29	3.54	PPM	OK
26-Jun-08	10:29:09	30	1.49	PPM	OK
26-Jun-08	10:29:26	31	2.12	PPM	OK
26-Jun-08	10:29:43	32	67.50	PPM	OK
26-Jun-08	10:30:00	33	1.15	PPM	OK
26-Jun-08	10:30:15	34	1.46	PPM	OK
26-Jun-08	10:30:31	35	4.15	PPM	OK
26-Jun-08	10:30:49	36	0.87	PPM	OK
26-Jun-08	10:31:07	37	192	PPM	OK
26-Jun-08	10:31:24	38	1052	PPM	FAIL;EXCEEDANCE

2-Jul-08	14:50:00		384	PPM	OK;RECHECKED EXCEEDANCE REQUIRES RECHECK AT ONE MONTH FROM INITIAL EXCEEDANCE
26-Jun-08	10:33:23	39	227	PPM	OK
26-Jun-08	10:33:41	40	164	PPM	OK
26-Jun-08	10:33:57	41	134	PPM	OK
26-Jun-08	10:34:15	42	121	PPM	OK
26-Jun-08	10:34:32	43	11.11	PPM	OK
26-Jun-08	10:34:49	44	13.20	PPM	OK
26-Jun-08	10:35:06	45	6.41	PPM	OK
26-Jun-08	10:35:39	46	1.88	PPM	OK
26-Jun-08	10:35:57	47	2.69	PPM	OK
26-Jun-08	10:36:16	48	2.12	PPM	OK
26-Jun-08	10:36:33	49	8.98	PPM	OK
26-Jun-08	10:36:52	50	6.90	PPM	OK
26-Jun-08	10:37:11	51	3.07	PPM	OK
26-Jun-08	10:37:30	52	19.59	PPM	OK
26-Jun-08	10:37:47	53	7.63	PPM	OK
26-Jun-08	10:38:04	54	6.87	PPM	OK
26-Jun-08	10:38:22	55	9.66	PPM	OK
26-Jun-08	10:38:39	56	6.30	PPM	OK
26-Jun-08	10:38:56	57	3.17	PPM	OK
26-Jun-08	10:39:13	58	10.11	PPM	OK
26-Jun-08	10:39:31	59	57.48	PPM	OK
26-Jun-08	10:39:48	60	6.24	PPM	OK
26-Jun-08	10:40:05	61	823	PPM	FAIL;EXCEEDANCE
2-Jul-08	14:52:00		323	PPM	OK;RECHECKED EXCEEDANCE REQUIRES RECHECK AT ONE MONTH FROM INITIAL EXCEEDANCE
26-Jun-08	10:40:40	62	40.94	PPM	OK
26-Jun-08	10:41:01	63	219	PPM	OK
26-Jun-08	10:41:22	64	97.85	PPM	OK
26-Jun-08	10:42:27	65	67.43	PPM	OK
26-Jun-08	10:42:46	66	68	PPM	OK
26-Jun-08	10:43:05	67	82.99	PPM	OK
26-Jun-08	10:43:25	68	19.74	PPM	OK
26-Jun-08	10:43:43	69	248	PPM	OK
26-Jun-08	10:44:01	70	14.86	PPM	OK
26-Jun-08	10:44:20	71	116	PPM	OK
26-Jun-08	10:44:37	72	48.27	PPM	OK
26-Jun-08	10:44:54	73	774	PPM	FAIL;EXCEEDANCE
2-Jul-08	14:53:00		200	PPM	OK;RECHECKED EXCEEDANCE REQUIRES RECHECK AT ONE MONTH FROM INITIAL EXCEEDANCE
26-Jun-08	10:45:59	74	267	PPM	OK
26-Jun-08	10:46:12	75	177	PPM	OK
26-Jun-08	10:46:36	76	73.53	PPM	OK

26-Jun-08	10:46:55	77	1034	PPM	FAIL;EXCEEDANCE
2-Jul-08	14:54:00		133	PPM	OK;RECHECKED EXCEEDANCE REQUIRES RECHECK AT ONE MONTH FROM INITIAL EXCEEDANCE
26-Jun-08	10:48:15	78	248	PPM	OK
26-Jun-08	10:48:34	79	209	PPM	OK
26-Jun-08	10:48:52	80	161	PPM	OK
26-Jun-08	10:49:10	81	62.43	PPM	OK
26-Jun-08	10:49:28	82	68.95	PPM	OK
26-Jun-08	10:49:45	83	227	PPM	OK
26-Jun-08	10:50:14	84	55.31	PPM	OK
26-Jun-08	10:50:32	85	19.34	PPM	OK
26-Jun-08	10:50:51	86	34.50	PPM	OK
26-Jun-08	10:51:09	87	29.71	PPM	OK
26-Jun-08	10:51:27	88	252	PPM	OK
26-Jun-08	10:51:44	89	268	PPM	OK
26-Jun-08	10:52:02	90	115	PPM	OK
26-Jun-08	10:52:20	91	189	PPM	OK
26-Jun-08	10:52:38	92	56.28	PPM	OK
26-Jun-08	10:52:57	93	34.18	PPM	OK
26-Jun-08	10:53:16	94	17.51	PPM	OK
26-Jun-08	10:53:36	95	6.75	PPM	OK
26-Jun-08	10:53:55	96	4.70	PPM	OK
26-Jun-08	10:54:15	97	3.69	PPM	OK
26-Jun-08	10:54:35	98	3.33	PPM	OK
26-Jun-08	10:54:53	99	3.82	PPM	OK
26-Jun-08	10:55:12	100	90.93	PPM	OK
26-Jun-08	10:55:31	101	50.51	PPM	OK
26-Jun-08	10:56:08	102	22.21	PPM	OK
26-Jun-08	10:56:28	103	31.54	PPM	OK
26-Jun-08	10:56:46	104	37.37	PPM	OK
26-Jun-08	10:57:06	105	19.52	PPM	OK
26-Jun-08	10:57:25	106	84.91	PPM	OK
26-Jun-08	10:57:44	107	28.34	PPM	OK
26-Jun-08	10:58:01	108	135	PPM	OK
26-Jun-08	10:58:20	109	67.81	PPM	OK
26-Jun-08	10:58:39	110	9.49	PPM	OK
26-Jun-08	10:58:57	111	45.50	PPM	OK
26-Jun-08	10:59:16	112	18.51	PPM	OK
26-Jun-08	10:59:34	113	32.59	PPM	OK
26-Jun-08	10:59:53	114	44.83	PPM	OK
26-Jun-08	11:00:10	115	19.69	PPM	OK
26-Jun-08	11:00:29	116	9.00	PPM	OK
26-Jun-08	11:00:47	117	10.98	PPM	OK
26-Jun-08	11:01:05	118	5.28	PPM	OK
26-Jun-08	11:01:25	119	4.46	PPM	OK
26-Jun-08	11:01:43	120	3.66	PPM	OK
26-Jun-08	11:02:02	121	19.80	PPM	OK
26-Jun-08	11:02:20	122	73.07	PPM	OK

26-Jun-08	11:02:38	123	163	PPM	OK
26-Jun-08	11:13:43	124	59.05	PPM	OK
26-Jun-08	11:14:05	125	43.08	PPM	OK
26-Jun-08	11:14:23	126	17.30	PPM	OK
26-Jun-08	11:14:42	127	19.30	PPM	OK
26-Jun-08	11:15:00	128	63.21	PPM	OK
26-Jun-08	11:15:18	129	15.93	PPM	OK
26-Jun-08	11:15:36	130	8.50	PPM	OK
26-Jun-08	11:15:55	131	35.61	PPM	OK
26-Jun-08	11:16:13	132	44.12	PPM	OK
26-Jun-08	11:16:31	133	11.57	PPM	OK
26-Jun-08	11:16:49	134	21.24	PPM	OK
26-Jun-08	11:17:07	135	75.17	PPM	OK
26-Jun-08	11:17:25	136	70.84	PPM	OK
26-Jun-08	11:17:43	137	135	PPM	OK
26-Jun-08	11:18:27	138	41.80	PPM	OK
26-Jun-08	11:18:45	139	16.11	PPM	OK
26-Jun-08	11:19:02	140	139	PPM	OK
26-Jun-08	11:19:22	141	5.46	PPM	OK
26-Jun-08	11:19:40	142	24.52	PPM	OK
26-Jun-08	11:19:59	143	7.00	PPM	OK
26-Jun-08	11:20:18	144	7.33	PPM	OK
26-Jun-08	11:20:42	145	15.22	PPM	OK
26-Jun-08	11:21:01	146	4.88	PPM	OK
26-Jun-08	11:21:20	147	4.71	PPM	OK
26-Jun-08	11:21:38	148	13.23	PPM	OK
26-Jun-08	11:21:57	149	3.71	PPM	OK
26-Jun-08	11:22:14	150	5.95	PPM	OK
26-Jun-08	11:22:33	151	5.92	PPM	OK
26-Jun-08	11:22:50	152	3.88	PPM	OK
26-Jun-08	11:23:08	153	14.01	PPM	OK
26-Jun-08	11:23:26	154	26.44	PPM	OK
26-Jun-08	11:23:44	155	13.11	PPM	OK
26-Jun-08	11:24:02	156	8.86	PPM	OK
26-Jun-08	11:24:19	157	5.80	PPM	OK
26-Jun-08	11:24:38	158	6.75	PPM	OK
26-Jun-08	11:24:56	159	4.57	PPM	OK
26-Jun-08	11:25:14	160	8.56	PPM	OK
26-Jun-08	11:25:32	161	5.94	PPM	OK
26-Jun-08	11:25:52	162	8.27	PPM	OK
26-Jun-08	11:26:10	163	14.65	PPM	OK
26-Jun-08	11:26:28	164	10.20	PPM	OK
26-Jun-08	11:26:46	165	25.76	PPM	OK
26-Jun-08	11:27:04	166	232	PPM	OK
26-Jun-08	11:30:34	167	44.58	PPM	OK
26-Jun-08	11:33:25	168	115	PPM	OK
26-Jun-08	11:33:43	169	29.25	PPM	OK
26-Jun-08	11:34:00	170	93.39	PPM	OK
26-Jun-08	11:34:18	171	48.19	PPM	OK
26-Jun-08	11:34:35	172	40.59	PPM	OK

26-Jun-08	11:34:52	173	15.39	PPM	OK
26-Jun-08	11:35:09	174	15.72	PPM	OK
26-Jun-08	11:35:28	175	32.95	PPM	OK
26-Jun-08	11:35:46	176	56.99	PPM	OK
26-Jun-08	11:36:05	177	97.38	PPM	OK
26-Jun-08	11:36:23	178	67.35	PPM	OK
26-Jun-08	11:36:42	179	13.45	PPM	OK
26-Jun-08	11:37:02	180	22.47	PPM	OK
26-Jun-08	11:37:51	181	33.33	PPM	OK
26-Jun-08	11:38:10	182	93.55	PPM	OK
26-Jun-08	11:38:28	183	11.29	PPM	OK
26-Jun-08	11:38:46	184	51.24	PPM	OK
26-Jun-08	11:39:05	185	32.78	PPM	OK
26-Jun-08	11:39:23	186	57.89	PPM	OK
26-Jun-08	11:39:40	187	13.86	PPM	OK
26-Jun-08	11:39:58	188	13.87	PPM	OK
26-Jun-08	11:40:19	189	50.99	PPM	OK
26-Jun-08	11:40:37	190	31.63	PPM	OK
26-Jun-08	11:40:53	191	46.44	PPM	OK
26-Jun-08	11:41:12	192	58.26	PPM	OK
26-Jun-08	11:41:29	193	17.70	PPM	OK
26-Jun-08	11:41:46	194	45.04	PPM	OK
26-Jun-08	11:42:03	195	14.31	PPM	OK
26-Jun-08	11:42:25	196	41.57	PPM	OK
26-Jun-08	11:42:43	197	58.82	PPM	OK
26-Jun-08	11:43:01	198	52.06	PPM	OK
26-Jun-08	11:43:19	199	68.50	PPM	OK
26-Jun-08	11:43:36	200	106	PPM	OK
26-Jun-08	11:43:54	201	62.37	PPM	OK
26-Jun-08	11:44:13	202	45.85	PPM	OK
26-Jun-08	11:44:32	203	47.14	PPM	OK
26-Jun-08	11:44:50	204	32.97	PPM	OK
26-Jun-08	11:45:07	205	30.13	PPM	OK
26-Jun-08	11:45:24	206	47.40	PPM	OK
26-Jun-08	11:45:42	207	132	PPM	OK
26-Jun-08	11:46:01	208	44.88	PPM	OK
26-Jun-08	11:46:42	209	163	PPM	OK
26-Jun-08	11:47:01	210	189	PPM	OK
26-Jun-08	11:47:19	211	398	PPM	OK
26-Jun-08	11:47:37	212	559	PPM	FAIL;EXCEEDANCE
2-Jul-08	15:00:00	212	9.64	PPM	OK;RECHECKED EXCEEDANCE REQUIRES RECHECK AT ONE MONTH FROM INITIAL EXCEEDANCE
26-Jun-08	11:48:58	213	240	PPM	OK
26-Jun-08	11:49:16	214	37.50	PPM	OK
26-Jun-08	11:49:35	215	67.67	PPM	OK
26-Jun-08	11:49:54	216	271	PPM	OK
26-Jun-08	11:50:13	217	134	PPM	OK
26-Jun-08	11:50:33	218	76.07	PPM	OK

26-Jun-08	11:50:51	219	108	PPM	OK
26-Jun-08	11:51:09	220	60.98	PPM	OK
26-Jun-08	11:51:28	221	30.30	PPM	OK
26-Jun-08	NA	222	NA	PPM	Instrument did not record
26-Jun-08	NA	223	NA	PPM	Instrument did not record
26-Jun-08	NA	224	NA	PPM	Instrument did not record
26-Jun-08	NA	225	NA	PPM	Instrument did not record
26-Jun-08	NA	226	NA	PPM	Instrument did not record
26-Jun-08	NA	227	NA	PPM	Instrument did not record
26-Jun-08	NA	228	NA	PPM	Instrument did not record
26-Jun-08	NA	229	NA	PPM	Instrument did not record
26-Jun-08	NA	230	NA	PPM	Instrument did not record
26-Jun-08	NA	231	NA	PPM	Instrument did not record
26-Jun-08	NA	232	NA	PPM	Instrument did not record
26-Jun-08	NA	233	NA	PPM	Instrument did not record
26-Jun-08	NA	234	NA	PPM	Instrument did not record
26-Jun-08	NA	235	NA	PPM	Instrument did not record
26-Jun-08	NA	236	NA	PPM	Instrument did not record
26-Jun-08	NA	237	NA	PPM	Instrument did not record
26-Jun-08	NA	238	NA	PPM	Instrument did not record
26-Jun-08	NA	239	NA	PPM	Instrument did not record
26-Jun-08	NA	240	NA	PPM	Instrument did not record
26-Jun-08	NA	241	NA	PPM	Instrument did not record
26-Jun-08	NA	242	NA	PPM	Instrument did not record
26-Jun-08	NA	243	NA	PPM	Instrument did not record
26-Jun-08	NA	244	NA	PPM	Instrument did not record
26-Jun-08	12:05:40	245	57.24	PPM	OK
26-Jun-08	12:06:01	246	88.94	PPM	OK
26-Jun-08	12:06:21	247	200	PPM	OK
26-Jun-08	12:06:40	248	357	PPM	OK
26-Jun-08	12:07:06	249	49.64	PPM	OK
26-Jun-08	12:07:23	250	146	PPM	OK
26-Jun-08	12:07:42	251	58.71	PPM	OK
26-Jun-08	12:07:59	252	39.11	PPM	OK
26-Jun-08	12:08:17	253	60.52	PPM	OK
26-Jun-08	12:08:34	254	51.33	PPM	OK
26-Jun-08	12:08:52	255	95.31	PPM	OK
26-Jun-08	12:09:10	256	102	PPM	OK
26-Jun-08	12:09:27	257	61.88	PPM	OK
26-Jun-08	12:09:45	258	131	PPM	OK
26-Jun-08	12:10:06	259	260	PPM	OK
26-Jun-08	12:10:54	260	65.60	PPM	OK
26-Jun-08	12:11:19	261	187	PPM	OK
26-Jun-08	12:11:37	262	107	PPM	OK
26-Jun-08	12:11:55	263	51.47	PPM	OK
26-Jun-08	12:12:12	264	166	PPM	OK
26-Jun-08	12:12:30	265	44.78	PPM	OK
26-Jun-08	12:12:47	266	33.59	PPM	OK
26-Jun-08	12:13:05	267	65.35	PPM	OK
26-Jun-08	12:13:23	268	123	PPM	OK

26-Jun-08	12:13:40	269	229	PPM	OK
26-Jun-08	12:13:59	270	101	PPM	OK
26-Jun-08	12:14:16	271	183	PPM	OK
26-Jun-08	12:14:34	272	231	PPM	OK
26-Jun-08	12:14:52	273	284	PPM	OK
26-Jun-08	12:15:11	274	60.25	PPM	OK
26-Jun-08	12:15:30	275	92.86	PPM	OK
26-Jun-08	12:15:48	276	229	PPM	OK
26-Jun-08	12:16:08	277	78.99	PPM	OK
26-Jun-08	12:16:25	278	106	PPM	OK
26-Jun-08	12:16:45	279	90.20	PPM	OK
26-Jun-08	12:17:02	280	178	PPM	OK
26-Jun-08	12:17:21	281	189	PPM	OK
26-Jun-08	12:17:40	282	144	PPM	OK
26-Jun-08	12:17:58	283	92.24	PPM	OK
26-Jun-08	12:18:15	284	80.36	PPM	OK
26-Jun-08	12:18:32	285	32.95	PPM	OK
26-Jun-08	12:18:50	286	99.79	PPM	OK
26-Jun-08	12:19:07	287	252	PPM	OK
26-Jun-08	12:19:24	288	284	PPM	OK
26-Jun-08	12:19:46	289	61.18	PPM	OK
26-Jun-08	13:15:53	290	13.44	PPM	OK
26-Jun-08	13:16:18	291	5.32	PPM	OK
26-Jun-08	13:16:37	292	7.54	PPM	OK
26-Jun-08	13:16:57	293	6.42	PPM	OK
26-Jun-08	13:17:17	294	7.98	PPM	OK
26-Jun-08	13:22:17	295	8.00	PPM	OK
26-Jun-08	13:22:37	296	7.31	PPM	OK
26-Jun-08	13:22:55	297	13.20	PPM	OK
26-Jun-08	13:23:15	298	8.69	PPM	OK
26-Jun-08	13:23:34	299	27.89	PPM	OK
26-Jun-08	13:24:08	300	5.41	PPM	OK
26-Jun-08	13:24:27	301	4.05	PPM	OK
26-Jun-08	13:24:46	302	22.73	PPM	OK
26-Jun-08	13:25:05	303	6.82	PPM	OK
26-Jun-08	13:25:34	304	12.66	PPM	OK
26-Jun-08	13:25:52	305	7.63	PPM	OK
26-Jun-08	13:26:09	306	14.49	PPM	OK
26-Jun-08	13:26:28	307	25.65	PPM	OK
26-Jun-08	13:26:46	308	5.61	PPM	OK
26-Jun-08	13:27:03	309	28.10	PPM	OK
26-Jun-08	13:27:21	310	15.43	PPM	OK
26-Jun-08	13:27:39	311	22.90	PPM	OK
26-Jun-08	13:27:57	312	10.42	PPM	OK
26-Jun-08	13:28:14	313	13.25	PPM	OK
26-Jun-08	13:28:31	314	5.11	PPM	OK
26-Jun-08	13:28:49	315	4.40	PPM	OK
26-Jun-08	13:29:14	316	6.30	PPM	OK
26-Jun-08	13:29:31	317	7.81	PPM	OK
26-Jun-08	13:29:48	318	7.77	PPM	OK

26-Jun-08	13:30:04	319	12.03	PPM	OK
26-Jun-08	13:30:22	320	4.61	PPM	OK
26-Jun-08	13:30:39	321	4.48	PPM	OK
26-Jun-08	13:30:58	322	4.08	PPM	OK
26-Jun-08	13:31:18	323	6.04	PPM	OK
26-Jun-08	13:31:37	324	9.27	PPM	OK
26-Jun-08	13:31:53	325	15.89	PPM	OK
26-Jun-08	13:32:37	326	4.91	PPM	OK
26-Jun-08	13:32:59	327	10.16	PPM	OK
26-Jun-08	13:33:17	328	5.98	PPM	OK
26-Jun-08	13:33:35	329	4.73	PPM	OK
26-Jun-08	13:33:51	330	4.15	PPM	OK
26-Jun-08	13:34:40	331	4.67	PPM	OK
26-Jun-08	13:34:57	332	4.08	PPM	OK
26-Jun-08	13:35:12	333	4.19	PPM	OK
26-Jun-08	13:35:29	334	4.09	PPM	OK
26-Jun-08	13:35:44	335	8.32	PPM	OK
26-Jun-08	13:36:01	336	9.00	PPM	OK
26-Jun-08	13:36:20	337	5.16	PPM	OK
26-Jun-08	13:36:34	338	10.14	PPM	OK
26-Jun-08	13:36:49	339	10.24	PPM	OK
26-Jun-08	13:37:05	340	5.73	PPM	OK
26-Jun-08	13:37:23	341	38.44	PPM	OK
26-Jun-08	13:38:07	342	11.27	PPM	OK
26-Jun-08	13:38:21	343	3.92	PPM	OK
26-Jun-08	13:38:35	344	4.40	PPM	OK
26-Jun-08	13:38:51	345	7.98	PPM	OK
26-Jun-08	13:39:08	346	5.99	PPM	OK
26-Jun-08	13:39:22	347	5.29	PPM	OK
26-Jun-08	13:39:39	348	6.00	PPM	OK
26-Jun-08	13:39:54	349	6.45	PPM	OK
26-Jun-08	13:40:09	350	4.23	PPM	OK
26-Jun-08	13:40:24	351	4.15	PPM	OK
26-Jun-08	13:40:41	352	9.00	PPM	OK
26-Jun-08	13:40:57	353	6.46	PPM	OK
26-Jun-08	13:41:11	354	10.37	PPM	OK
26-Jun-08	13:41:27	355	7.99	PPM	OK
26-Jun-08	13:41:45	356	4.71	PPM	OK
26-Jun-08	13:42:40	357	19.95	PPM	OK
26-Jun-08	13:42:55	358	4.61	PPM	OK
26-Jun-08	13:45:11	359	4.86	PPM	OK
26-Jun-08	13:45:31	360	4.36	PPM	OK
26-Jun-08	13:45:50	361	4.08	PPM	OK
26-Jun-08	13:46:08	362	5.20	PPM	OK
26-Jun-08	13:46:24	363	5.44	PPM	OK
26-Jun-08	13:46:41	364	5.41	PPM	OK
26-Jun-08	13:46:58	365	3.42	PPM	OK
26-Jun-08	13:47:12	366	13.54	PPM	OK
26-Jun-08	13:47:27	367	4.80	PPM	OK
26-Jun-08	13:48:07	368	4.08	PPM	OK

26-Jun-08	13:48:20	369	57.76	PPM	OK
26-Jun-08	13:48:36	370	6.90	PPM	OK
26-Jun-08	13:48:51	371	6.86	PPM	OK
26-Jun-08	13:49:08	372	5.00	PPM	OK
26-Jun-08	13:49:28	373	3.62	PPM	OK
26-Jun-08	13:52:44	374	6.82	PPM	OK
26-Jun-08	13:53:34	375	6.12	PPM	OK
26-Jun-08	14:43:04	376	9.85	PPM	OK
26-Jun-08	14:43:22	377	11.12	PPM	OK
26-Jun-08	14:43:39	378	11.77	PPM	OK
26-Jun-08	14:43:59	379	24.44	PPM	OK
26-Jun-08	14:44:18	380	6.41	PPM	OK
26-Jun-08	14:44:35	381	5.88	PPM	OK
26-Jun-08	14:44:53	382	5.21	PPM	OK
26-Jun-08	14:45:12	383	5.28	PPM	OK
26-Jun-08	14:45:33	384	7.49	PPM	OK
26-Jun-08	14:45:47	385	7.25	PPM	OK
26-Jun-08	14:46:19	386	6.70	PPM	OK
26-Jun-08	14:46:35	387	5.65	PPM	OK
26-Jun-08	14:46:52	388	5.75	PPM	OK
26-Jun-08	14:47:09	389	5.41	PPM	OK
26-Jun-08	14:47:26	390	6.02	PPM	OK
26-Jun-08	14:47:45	391	6.63	PPM	OK
26-Jun-08	14:48:00	392	6.21	PPM	OK
26-Jun-08	14:48:17	393	5.71	PPM	OK
26-Jun-08	14:48:37	394	6.40	PPM	OK
26-Jun-08	14:48:56	395	5.71	PPM	OK
26-Jun-08	14:49:13	396	5.90	PPM	OK
26-Jun-08	14:49:32	397	5.95	PPM	OK
26-Jun-08	14:49:49	398	5.86	PPM	OK
26-Jun-08	14:50:13	399	5.84	PPM	OK
26-Jun-08	14:50:31	400	5.33	PPM	OK
26-Jun-08	14:51:03	401	4.95	PPM	OK
26-Jun-08	14:51:19	402	5.30	PPM	OK
26-Jun-08	14:51:37	403	5.82	PPM	OK
26-Jun-08	14:51:52	404	6.50	PPM	OK
26-Jun-08	14:52:06	405	6.65	PPM	OK
26-Jun-08	14:52:22	406	6.58	PPM	OK
26-Jun-08	14:52:38	407	6.90	PPM	OK
26-Jun-08	14:53:03	408	7.20	PPM	OK
26-Jun-08	14:53:22	409	6.50	PPM	OK
26-Jun-08	14:53:40	410	6.17	PPM	OK
26-Jun-08	14:53:58	411	5.24	PPM	OK
26-Jun-08	14:54:31	412	5.59	PPM	OK
26-Jun-08	14:55:04	413	4.91	PPM	OK
26-Jun-08	14:55:21	414	6.57	PPM	OK
26-Jun-08	14:55:38	415	5.78	PPM	OK
26-Jun-08	14:55:54	416	6.00	PPM	OK
26-Jun-08	14:56:14	417	5.04	PPM	OK
26-Jun-08	14:56:31	418	5.00	PPM	OK

26-Jun-08	14:56:48	419	4.69	PPM	OK
26-Jun-08	14:57:06	420	4.73	PPM	OK
26-Jun-08	14:57:47	421	4.91	PPM	OK
26-Jun-08	14:58:04	422	5.54	PPM	OK
26-Jun-08	14:58:59	423	4.48	PPM	OK
26-Jun-08	14:59:15	424	4.40	PPM	OK
26-Jun-08	14:59:31	425	4.58	PPM	OK
26-Jun-08	14:59:47	426	5.08	PPM	OK
26-Jun-08	15:00:22	427	4.73	PPM	OK
26-Jun-08	15:00:39	428	4.86	PPM	OK
26-Jun-08	15:00:57	429	4.66	PPM	OK
26-Jun-08	15:01:17	430	4.51	PPM	OK
26-Jun-08	15:01:30	431	4.17	PPM	OK
26-Jun-08	15:01:50	432	4.11	PPM	OK
26-Jun-08	15:02:09	433	4.96	PPM	OK
26-Jun-08	15:02:28	434	4.76	PPM	OK
26-Jun-08	15:03:03	435	4.44	PPM	OK
26-Jun-08	15:03:32	436	4.40	PPM	OK
26-Jun-08	15:04:07	437	5.00	PPM	OK
26-Jun-08	15:04:44	438	5.05	PPM	OK
26-Jun-08	15:05:22	439	6.28	PPM	OK
26-Jun-08	15:05:52	440	6.84	PPM	OK
26-Jun-08	15:06:18	441	7.45	PPM	OK
26-Jun-08	15:06:47	442	6.49	PPM	OK

NA = No data recorded

History for Sanford, FL

Thursday, June 26, 2008

Daily Summary

	Actual:	Average :	Record :
Temperature:			
Mean Temperature	**80** °F / **26** °C	-	
Max Temperature	**91** °F / **32** °C	**90** °F / **32** °C	**98** °F / **36** °C (1987)
Min Temperature	**71** °F / **21** °C	**69** °F / **20** °C	**63** °F / **17** °C (1966)
Cooling Degree Days	14		
Growing Degree Days	30 (Base 50)		
Moisture:			
Dew Point	**67** °F / **19** °C		
Average Humidity	74		
Maximum Humidity	90		
Minimum Humidity	51		
Precipitation:			
Precipitation	**0.45** in / **1.14** cm	-	- ()
Sea Level Pressure:			
Sea Level Pressure	**30.16** in / **1021** hPa		
Wind:			
Wind Speed	**5** mph / **8** km/h (SE)		
Max Wind Speed	**23** mph / **37** km/h		
Max Gust Speed	**34** mph / **55** km/h		
Visibility	**8** miles / **14** kilometers		
Events	Rain , Thunderstorm		

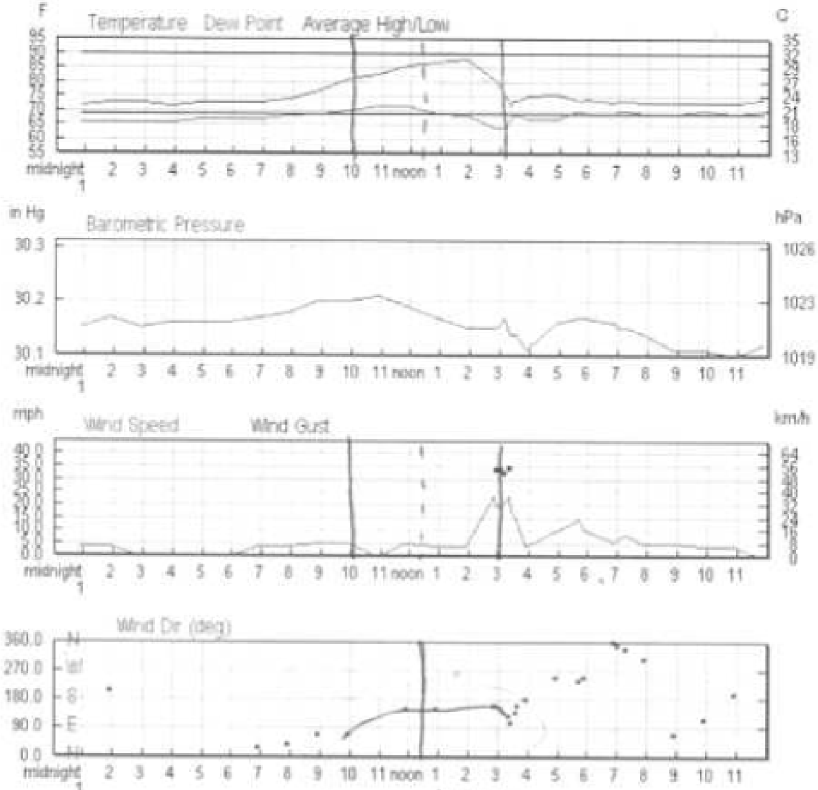
Averages and records for this station are not official NWS values.

Click here for data from the nearest station with official NWS data (KMCO).

T = Trace of Precipitation, **MM** = Missing Value

Source: NWS Daily Summary

Seasonal Weather Averages



Hourly Observations

Time (EDT):	Temp.:	Dew Point:	Humidity:	Sea Level Pressure:	Visibility:	Wind Dir:	Wind Speed:	Gust Speed:	Precip:	Events:	Conditions
12:53 AM	72.0 °F / 22.2 °C	66.0 °F / 18.9 °C	81%	30.15 in / 1020.9 hPa	6.0 miles / 9.7 kilometers	NE	3.5 mph / 5.6 km/h / 1.5 m/s	-	N/A		Haze
1:53 AM	73.0 °F / 22.8 °C	66.0 °F / 18.9 °C	79%	30.17 in / 1021.4 hPa	10.0 miles / 16.1 kilometers	SSW	3.5 mph / 5.6 km/h / 1.5 m/s	-	N/A		Clear
2:53 AM	73.0 °F / 22.8 °C	66.0 °F / 18.9 °C	79%	30.15 in / 1020.8 hPa	10.0 miles / 16.1 kilometers	Calm	Calm	-	N/A		Clear
3:53 AM	72.0 °F / 22.2 °C	66.0 °F / 18.9 °C	81%	30.16 in / 1021.2 hPa	10.0 miles / 16.1 kilometers	Calm	Calm	-	N/A		Clear
4:53 AM	73.0 °F / 22.8 °C	66.9 °F / 19.4 °C	81%	30.16 in / 1021.1 hPa	10.0 miles / 16.1 kilometers	Calm	Calm	-	N/A		Clear
5:53 AM	73.0 °F / 22.8 °C	66.9 °F / 19.4 °C	81%	30.16 in / 1021.2 hPa	10.0 miles / 16.1 kilometers	Calm	Calm	-	N/A		Clear
6:53 AM	73.0 °F / 22.8 °C	66.9 °F / 19.4 °C	81%	30.17 in / 1021.6 hPa	9.0 miles / 14.5 kilometers	NNE	3.5 mph / 5.6 km/h / 1.5 m/s	-	N/A		Clear
7:53 AM	73.9 °F / 23.3 °C	68.0 °F / 20.0 °C	82%	30.18 in / 1021.9 hPa	10.0 miles / 16.1 kilometers	NE	3.5 mph / 5.6 km/h / 1.5 m/s	-	N/A		Clear
8:53 AM	77.0 °F / 25.0 °C	69.1 °F / 20.6 °C	76%	30.20 in / 1022.6 hPa	10.0 miles / 16.1 kilometers	ENE	4.6 mph / 7.4 km/h / 2.1 m/s	-	N/A		Clear
9:53 AM	81.0 °F /	70.0 °F /	69%	30.20 in / 1022.7 hPa	10.0 miles / 16.1 kilometers	ENE	4.6 mph / 7.4 km/h /	-	N/A		Clear

	27.2 °C	21.1 °C					2.1 m/s				
10:53 AM	82.9 °F / 28.3 °C	72.0 °F / 22.2 °C	69%	30.21 in / 1022.8 hPa	10.0 miles / 16.1 kilometers	Calm	Calm	-	N/A		Clear
11:53 AM	86.0 °F / 30.0 °C	72.0 °F / 22.2 °C	63%	30.19 in / 1022.2 hPa	10.0 miles / 16.1 kilometers	SSE	4.6 mph / 7.4 km/h / 2.1 m/s	-	N/A		Clear
12:53 PM	87.1 °F / 30.6 °C	69.1 °F / 20.6 °C	55%	30.17 in / 1021.7 hPa	10.0 miles / 16.1 kilometers	SSE	3.5 mph / 5.6 km/h / 1.5 m/s	-	N/A		Scattered Clouds
1:53 PM	88.0 °F / 31.1 °C	68.0 °F / 20.0 °C	51%	30.15 in / 1020.8 hPa	10.0 miles / 16.1 kilometers	Variable	3.5 mph / 5.6 km/h / 1.5 m/s	-	N/A		Clear
2:51 PM	80.6 °F / 27.0 °C	64.4 °F / 18.0 °C	58%	30.15 in / 1020.9 hPa	10.0 miles / 16.1 kilometers	SSE	23.0 mph / 37.0 km/h / 10.3 m/s	33.4 mph / 53.7 km/h / 14.9 m/s	N/A	Thunderstorm	Thunderstorm
2:53 PM	80.1 °F / 26.7 °C	64.0 °F / 17.8 °C	58%	30.15 in / 1020.9 hPa	10.0 miles / 16.1 kilometers	SSE	19.6 mph / 31.5 km/h / 8.7 m/s	33.4 mph / 53.7 km/h / 14.9 m/s	N/A	Thunderstorm	Thunderstorm
3:05 PM	77.0 °F / 25.0 °C	64.4 °F / 18.0 °C	65%	30.16 in / 1021.2 hPa	10.0 miles / 16.1 kilometers	SSE	19.6 mph / 31.5 km/h / 8.7 m/s	33.4 mph / 53.7 km/h / 14.9 m/s	N/A	Thunderstorm	Thunderstorm
3:10 PM	75.2 °F / 24.0 °C	64.4 °F / 18.0 °C	69%	30.17 in / 1021.6 hPa	2.0 miles / 3.2 kilometers	SE	20.7 mph / 33.3 km/h / 9.3 m/s	32.2 mph / 51.9 km/h / 14.4 m/s	0.11 in / 0.3 cm	Rain , Thunderstorm	Heavy Thunderstorms and Rain
3:20 PM	71.6 °F / 22.0 °C	66.2 °F / 19.0 °C	83%	30.14 in / 1020.5 hPa	0.5 miles / 0.8 kilometers	SE	23.0 mph / 37.0 km/h / 10.3 m/s	34.5 mph / 55.6 km/h / 15.4 m/s	0.27 in / 0.7 cm	Rain , Thunderstorm	Heavy Thunderstorms and Rain
3:25 PM	73.4 °F / 23.0 °C	68.0 °F / 20.0 °C	83%	30.14 in / 1020.5 hPa	1.0 miles / 1.6 kilometers	ESE	17.3 mph / 27.8 km/h / 7.7 m/s	-	0.30 in / 0.8 cm	Rain	Heavy Rain
3:32 PM	73.4 °F / 23.0 °C	68.0 °F / 20.0 °C	83%	30.14 in / 1020.5 hPa	3.0 miles / 4.8 kilometers	SE	15.0 mph / 24.1 km/h / 6.7 m/s	-	0.30 in / 0.8 cm	Rain	Light Rain
3:38 PM	73.4 °F / 23.0 °C	68.0 °F / 20.0 °C	83%	30.13 in / 1020.2 hPa	8.0 miles / 12.9 kilometers	SSE	12.7 mph / 20.4 km/h / 5.7 m/s	-	0.30 in / 0.8 cm	Rain	Light Rain
3:53 PM	75.0 °F / 23.9 °C	66.9 °F / 19.4 °C	76%	30.11 in / 1019.6 hPa	10.0 miles / 16.1 kilometers	South	3.5 mph / 5.6 km/h / 1.5 m/s	-	0.30 in / 0.8 cm		Partly Cloudy
4:53 PM	75.9 °F / 24.4 °C	66.9 °F / 19.4 °C	74%	30.16 in / 1021.1 hPa	10.0 miles / 16.1 kilometers	WSW	9.2 mph / 14.8 km/h / 4.1 m/s	-	0.00 in / 0.0 cm		Clear
5:42 PM	73.4 °F / 23.0 °C	69.8 °F / 21.0 °C	88%	30.17 in / 1021.6 hPa	6.0 miles / 9.7 kilometers	WSW	13.8 mph / 22.2 km/h / 6.2 m/s	-	0.04 in / 0.1 cm	Rain	Rain
5:53 PM	73.9 °F / 23.3 °C	69.1 °F / 20.6 °C	85%	30.17 in / 1021.5 hPa	5.0 miles / 8.0 kilometers	WSW	10.4 mph / 16.7 km/h / 4.6 m/s	-	0.06 in / 0.2 cm	Rain	Rain
6:53 PM	73.0 °F / 22.8 °C	69.1 °F / 20.6 °C	87%	30.16 in / 1021.3 hPa	7.0 miles / 11.3 kilometers	North	5.8 mph / 9.3 km/h / 2.6 m/s	-	0.08 in / 0.2 cm	Rain	Light Rain
7:00 PM	73.4 °F / 23.0 °C	69.8 °F / 21.0 °C	88%	30.15 in / 1020.9 hPa	9.0 miles / 14.5 kilometers	North	6.9 mph / 11.1 km/h / 3.1 m/s	-	0.00 in / 0.0 cm	Rain	Light Rain
	73.4 °F	69.8 °F					8.1 mph /		0.01 in		

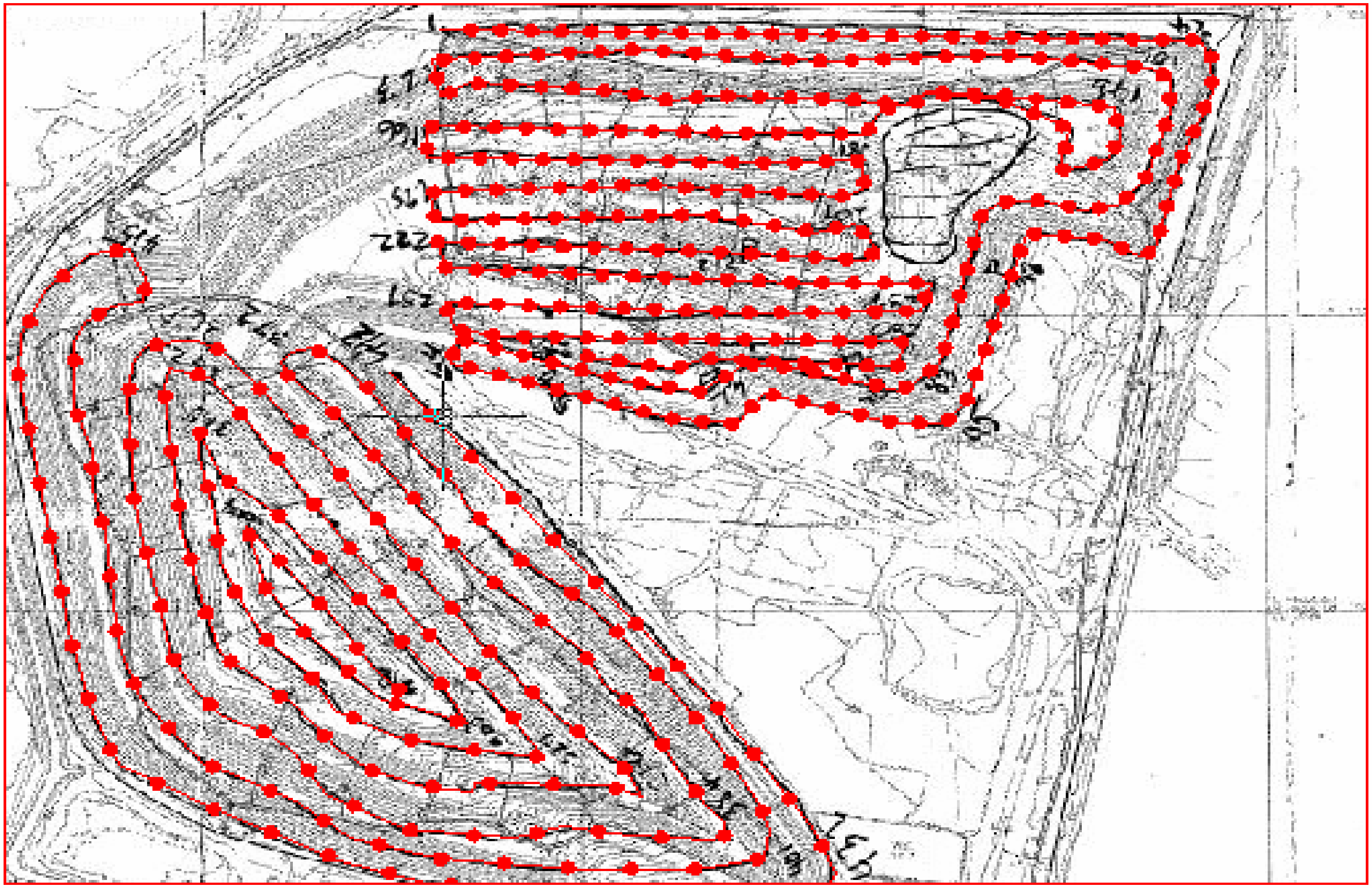


Figure A-3: Seminole County Landfill 2nd Quarter 2008 VOC Readings

APPENDIX B: ESTIMATING METHANE EMISSIONS (INPUT-CONCENTRATION FILES)

(The X and Y coordinates are in Universal Transverse Mercator (UTM) which is the metric equivalent of latitude and longitude in map projections. The last column C is the concentration of methane recorded at that receptor in units of ug/m^3 during the surface emissions monitoring report minus background concentrations.)

4th Quarter 2006

	Receptors, i		
No.	x_r (meters)	y_r (meters)	C_{total} (ug/m^3)
1	491798.9	3184743.5	523.2
2	491780.4	3184775.3	0.0
3	491761.9	3184807.1	0.0
4	491743.4	3184838.9	0.0
5	491724.9	3184870.7	0.0
6	491706.3	3184902.5	0.0
7	491687.5	3184934.8	0.0
8	491665.6	3184962.2	0.0
9	491643.7	3184989.6	0.0
10	491621.8	3185017.0	0.0
11	491599.9	3185044.4	0.0
12	491578.0	3185071.8	0.0
13	491556.1	3185099.2	65.8
14	491534.2	3185126.6	0.0
15	491512.2	3185154.0	1338.4
16	491499.5	3185167.2	1351.7
17	491486.7	3185180.3	15396.6
18	491474.0	3185193.4	15078.4
19	491461.2	3185206.6	5514.1
20	491448.4	3185219.7	6435.4
21	491435.7	3185232.8	6349.3
22	491422.9	3185246.0	5401.4
23	491410.1	3185259.1	6104.0
24	491397.7	3185272.0	53587.5
25	491372.6	3185286.2	15728.0
26	491347.6	3185300.4	8470.2
27	491322.6	3185314.7	8529.9
28	491297.5	3185329.0	10266.4
29	491270.3	3185331.1	3220.8
30	491243.2	3185333.3	655.7
31	491216.1	3185335.5	72.5
32	491188.8	3185337.7	25146.5
33	491170.1	3185323.1	14415.6
34	491151.3	3185308.6	23834.1

35	491132.6	3185294.0	19691.6
36	491113.9	3185279.5	6130.5
37	491095.1	3185265.0	4665.7
38	491076.5	3185250.5	4447.0
39	491085.2	3185218.2	27075.2
40	491093.8	3185186.0	66876.8
41	491102.5	3185153.7	45653.7
42	491111.1	3185121.5	19943.4
43	491119.8	3185089.2	30767.1
44	491128.4	3185056.9	44580.0
45	491137.1	3185024.7	94714.7
46	491145.7	3184992.4	54561.8
47	491154.4	3184960.2	24404.1
48	491163.0	3184927.9	102005.5
49	491171.7	3184895.6	12036.1
50	491180.5	3184863.0	14667.5
51	491223.0	3184831.0	3015.3
52	491252.6	3184822.9	1815.7
53	491282.2	3184814.8	8370.8
54	491311.8	3184806.7	15429.7
55	491341.4	3184798.7	0.0
56	491371.1	3184790.6	384.0
57	491400.7	3184782.5	10750.3
58	491430.3	3184774.4	12964.1
59	491459.9	3184766.4	7674.9
60	491489.5	3184758.3	12195.2
61	491519.1	3184750.2	4924.2
62	491548.8	3184742.1	11996.4
63	491578.4	3184734.1	5507.5
64	491608.0	3184726.0	10186.9
65	491661.8	3184723.6	3121.4
66	491715.6	3184721.2	1577.0
67	491769.3	3184718.8	125.5
68	491742.5	3184788.0	1988.0
69	491726.8	3184813.1	2876.1
70	491711.2	3184838.3	50923.0
71	491695.5	3184863.5	741.9
72	491679.9	3184888.7	185.2
73	491664.3	3184913.8	1557.2
74	491643.0	3184937.4	1775.9
75	491621.8	3184961.0	3857.1
76	491600.5	3184984.7	39.3
77	491579.2	3185008.3	0.0

78	491558.0	3185031.9	3234.1
79	491536.7	3185055.6	28195.4
80	491515.4	3185079.2	2869.5
81	491494.2	3185102.8	11903.6
82	491472.9	3185126.5	5288.8
83	491451.6	3185150.1	1676.5
84	491430.3	3185173.7	2166.9
85	491409.1	3185197.4	1504.1
86	491387.8	3185221.0	1941.6
87	491366.5	3185244.6	2147.1
88	491345.3	3185268.3	2597.8
89	491323.8	3185292.1	4029.4
90	491283.7	3185281.5	4546.4
91	491243.7	3185270.9	4029.4
92	491203.6	3185260.3	3320.2
93	491163.6	3185249.7	7628.5
94	491123.5	3185239.1	2949.1
95	491129.6	3185209.9	3817.3
96	491135.7	3185180.7	5023.6
97	491141.8	3185151.5	3744.4
98	491148.0	3185122.3	2365.8
99	491154.1	3185093.1	2584.5
100	491160.2	3185063.9	2113.9
101	491166.3	3185034.7	2571.3
102	491172.5	3185005.2	3293.7
103	491188.1	3184972.6	960.6
104	491203.8	3184940.0	17908.6
105	491219.1	3184907.4	79470.1
106	491235.0	3184874.9	7973.1
107	491271.4	3184861.5	1331.8
108	491307.8	3184848.0	2882.8
109	491344.2	3184834.5	5779.2
110	491380.6	3184821.0	781.7
111	491417.0	3184807.5	1285.4
112	491455.2	3184805.6	569.6
113	491493.4	3184803.7	231.5
114	491531.6	3184801.8	576.2
115	491569.8	3184799.9	6945.8
116	491608.0	3184798.0	5878.7
117	491621.7	3184832.6	2279.6
118	491633.5	3184862.0	1079.9
119	491607.6	3184894.8	1437.9
120	491581.6	3184927.5	1497.5

121	491555.7	3184960.3	801.6
122	491529.7	3184993.1	1139.6
123	491503.8	3185025.9	1186.0
124	491477.8	3185058.6	1371.6
125	491451.9	3185091.4	934.1
126	491425.9	3185124.2	7277.2
127	491400.0	3185157.0	6693.9
128	491374.1	3185189.7	4798.3
129	491348.1	3185222.5	20023.0
130	491322.0	3185255.5	5202.6
131	491292.8	3185242.7	3936.6
132	491263.6	3185229.9	5401.4
133	491234.4	3185217.1	1901.8
134	491205.2	3185204.3	2312.8
135	491176.0	3185191.5	2849.6
136	491185.4	3185153.6	2445.3
137	491194.9	3185115.6	3485.9
138	491204.3	3185077.7	5931.7
139	491213.7	3185039.7	10332.7
140	491223.2	3185001.8	2531.5
141	491232.6	3184963.8	2147.1
142	491242.0	3184926.0	1736.1
143	491286.2	3184913.1	1616.8
144	491330.5	3184900.1	1305.3
145	491374.7	3184887.2	1298.7
146	491419.0	3184874.2	4049.3
147	491463.2	3184861.3	1033.5
148	491507.5	3184848.4	755.2
149	491551.5	3184835.5	602.7
150	491563.9	3184859.0	1212.5
151	491573.4	3184881.1	1676.5
152	491548.8	3184911.0	2120.5
153	491524.1	3184940.9	4519.9
154	491499.5	3184970.8	31476.3
155	491474.8	3185000.7	4002.9
156	491450.2	3185030.6	1510.8
157	491425.6	3185060.5	2180.2
158	491400.9	3185090.3	2617.7
159	491376.3	3185120.2	26591.4
160	491351.6	3185150.1	7383.2
161	491327.0	3185180.0	3452.8
162	491312.3	3185175.4	4606.1
163	491297.5	3185170.8	1484.3

164	491282.8	3185166.3	1020.3
165	491268.0	3185161.7	2418.8
166	491253.3	3185157.1	2703.8
167	491238.5	3185152.5	3240.7
168	491241.8	3185132.6	3466.0
169	491245.1	3185112.6	4115.6
170	491248.4	3185092.7	25391.7
171	491251.7	3185072.8	13355.1
172	491255.0	3185052.9	1802.4
173	491258.3	3185032.9	2001.2
174	491261.6	3185013.0	1756.0
175	491264.9	3184993.1	1703.0
176	491268.2	3184973.1	2200.1
177	491271.5	3184953.0	2087.4
178	491352.1	3184930.5	1901.8
179	491432.8	3184908.0	2465.2
180	491513.5	3184885.5	2041.0
181	491491.5	3184912.3	2147.1
182	491469.6	3184939.0	3930.0
183	491447.6	3184965.8	3379.9
184	491425.6	3184992.6	30912.9
185	491403.6	3185019.3	2717.1
186	491381.6	3185046.1	4181.9
187	491359.7	3185072.8	4281.3
188	491337.5	3185099.8	6210.1
189	491317.5	3185082.0	1371.6
190	491299.4	3185062.9	1775.9
191	491300.5	3185039.0	1583.7
192	491307.8	3185016.7	2100.7
193	491317.5	3184990.5	3539.0
194	491347.3	3184976.6	3857.1
195	491377.2	3184962.8	2173.6
196	491407.0	3184948.9	1557.2
197	491437.0	3184935.0	1577.0
198	491428.1	3184947.5	1848.8
199	491419.2	3184959.9	1968.1
200	491410.4	3184972.4	2312.8
201	491401.5	3184984.8	2644.2
202	491392.6	3184997.3	3777.6
203	491383.7	3185009.7	3963.2
204	491374.8	3185022.2	3989.7
205	491365.9	3185034.7	6912.6
206	491357.1	3185047.1	3830.6

207	491348.4	3185059.2	4592.8
208	491349.0	3185038.0	2968.9
209	491352.0	3185013.5	3631.7
210	492068.4	3185415.8	138.8
211	492041.0	3185423.1	728.7
212	492013.5	3185430.3	4168.6
213	491986.0	3185437.5	3260.6
214	491982.8	3185410.9	1146.2
215	491979.7	3185384.3	1106.5
216	491976.5	3185357.7	1033.5
217	491973.3	3185331.1	430.4
218	491922.3	3185339.2	556.3
219	491915.5	3185266.4	894.4
220	491884.7	3185267.2	1119.7
221	491853.8	3185267.9	1590.3
222	491823.0	3185268.6	894.4
223	491792.2	3185269.4	2001.2
224	491761.4	3185270.1	2193.5
225	491730.5	3185270.9	1278.8
226	491699.7	3185271.6	1981.4
227	491668.9	3185272.4	2060.9
228	491638.1	3185273.1	1285.4
229	491607.3	3185273.9	2379.0
230	491576.4	3185274.6	1424.6
231	491545.6	3185275.4	1729.5
232	491514.8	3185276.1	2405.6
233	491484.0	3185276.8	2630.9
234	491453.1	3185277.6	2836.4
235	491430.5	3185305.0	22342.8
236	491407.9	3185332.4	2518.2
237	491385.3	3185359.8	33458.1
238	491362.7	3185387.2	9988.1
239	491340.1	3185414.6	45567.5
240	491317.5	3185442.0	7476.0
241	491316.7	3185464.0	67539.6
242	491315.8	3185486.0	70190.8
243	491315.0	3185508.0	123878.2
244	491314.2	3185530.0	79470.1
245	491313.3	3185552.0	265056.0
246	491312.5	3185574.0	109296.4
247	491335.7	3185581.8	128517.8
248	491359.0	3185589.7	174251.5
249	491382.2	3185597.5	120564.1

250	491405.5	3185605.3	213357.1
251	491428.7	3185613.2	62336.6
252	491452.0	3185621.0	56331.5
253	491512.4	3185620.9	74167.7
254	491572.9	3185620.7	32251.8
255	491633.3	3185620.6	22236.7
256	491693.8	3185620.5	39184.7
257	491754.2	3185620.3	115261.7
258	491814.7	3185620.2	56835.3
259	491875.1	3185620.0	63576.0
260	491935.6	3185619.9	24105.9
261	491996.0	3185619.8	9868.8
262	492056.5	3185619.6	19512.6
263	492117.0	3185619.5	4128.9
264	492110.0	3185591.3	5514.1
265	492103.1	3185563.1	5302.0
266	492096.1	3185534.9	19240.9
267	492089.1	3185506.7	3539.0
268	492082.1	3185478.6	1828.9
269	492052.0	3185478.7	2060.9
270	492021.9	3185478.9	23456.3
271	491991.8	3185479.1	47913.9
272	491961.6	3185479.3	12824.9
273	491931.5	3185479.5	15376.7
274	491923.1	3185455.7	41849.2
275	491914.7	3185431.8	24808.4
276	491906.3	3185408.0	40377.8
277	491897.8	3185384.2	38276.7
278	491889.4	3185360.3	10882.9
279	491881.0	3185336.5	12367.5
280	491872.6	3185312.7	13348.5
281	491835.7	3185314.3	13666.6
282	491798.9	3185315.9	13799.2
283	491762.0	3185317.5	30992.4
284	491725.2	3185319.1	27572.3
285	491688.3	3185320.8	15853.9
286	491651.4	3185322.4	4592.8
287	491614.6	3185324.0	35850.8
288	491577.7	3185325.6	35698.3
289	491540.9	3185327.2	42717.5
290	491504.0	3185328.9	10127.3
291	491467.0	3185330.5	14110.7
292	491454.3	3185355.9	66214.0

293	491441.6	3185381.3	97365.9
294	491429.0	3185406.7	103331.2
295	491416.3	3185432.2	40218.7
296	491403.6	3185457.6	26816.7
297	491408.2	3185477.9	14806.7
298	491412.9	3185498.3	54144.3
299	491417.5	3185518.6	50810.3
300	491422.2	3185539.0	59035.8
301	491426.8	3185559.4	82121.3
302	491455.4	3185560.0	73504.9
303	491484.0	3185560.6	50618.1
304	491512.6	3185561.2	38389.3
305	491541.2	3185561.8	40159.0
306	491569.8	3185562.5	23230.9
307	491598.4	3185563.1	22018.0
308	491627.0	3185563.7	25405.0
309	491655.6	3185564.3	24119.1
310	491684.2	3185564.9	21388.3
311	491712.8	3185565.6	15542.4
312	491741.4	3185566.2	23482.8
313	491770.0	3185566.8	29938.6
314	491798.6	3185567.4	19426.4
315	491827.2	3185568.0	12738.7
316	491855.8	3185568.7	16788.5
317	491884.4	3185569.3	15283.9
318	491913.0	3185569.9	27002.3
319	491941.6	3185570.5	11260.7
320	491970.2	3185571.1	29772.9
321	491998.8	3185571.8	4162.0
322	492027.4	3185572.4	7124.7
323	492056.0	3185573.0	15144.7
324	492053.8	3185557.9	10392.4
325	492051.5	3185542.7	11969.9
326	492049.3	3185527.6	4778.4
327	492047.0	3185512.5	8695.6
328	492010.6	3185511.7	9756.1
329	491974.3	3185510.9	21421.5
330	491937.9	3185510.1	22475.3
331	491901.5	3185509.3	8582.9
332	491865.0	3185508.5	22309.6
333	491861.8	3185491.8	60646.4
334	491858.7	3185475.2	35201.2
335	491855.5	3185458.5	37242.7

336	491852.4	3185441.8	24145.6
337	491849.2	3185425.2	41829.3
338	491846.0	3185408.5	13706.4
339	491842.9	3185391.8	30548.3
340	491839.7	3185375.2	19227.6
341	491836.6	3185358.5	20208.5
342	491811.2	3185361.3	7867.1
343	491785.9	3185364.1	15555.6
344	491760.6	3185366.9	28195.4
345	491735.3	3185369.7	36453.9
346	491710.0	3185372.5	30462.2
347	491684.7	3185375.3	48092.8
348	491659.4	3185378.1	40338.0
349	491634.0	3185381.0	18982.4
350	491608.7	3185383.8	49173.2
351	491583.4	3185386.6	75493.3
352	491558.1	3185389.4	99354.3
353	491532.8	3185392.2	22362.7
354	491507.5	3185395.0	160332.6
355	491499.6	3185419.0	47496.3
356	491491.7	3185443.0	40855.0
357	491483.8	3185467.1	78144.5
358	491476.0	3185490.8	44334.7
359	491500.1	3185493.5	51592.5
360	491524.2	3185496.1	32907.9
361	491548.2	3185498.7	116587.3
362	491572.3	3185501.3	15840.7
363	491596.4	3185504.0	12877.9
364	491620.5	3185506.6	20387.5
365	491644.6	3185509.2	25113.3
366	491668.7	3185511.8	17756.2
367	491692.8	3185514.4	12645.9
368	491716.9	3185517.1	10372.5
369	491741.0	3185519.7	10385.8
370	491765.1	3185522.3	20188.7
371	491789.1	3185524.9	19101.7
372	491813.2	3185527.5	9066.8
373	491837.3	3185530.2	16569.7
374	491861.4	3185532.8	52706.0
375	491885.5	3185535.4	15979.8
376	491909.6	3185538.0	33782.8
377	491933.7	3185540.6	10445.4
378	491957.8	3185543.3	4917.6

379	491981.9	3185545.9	3539.0
380	492006.0	3185548.5	3399.8
381	492006.5	3185533.5	2995.5
382	491980.7	3185529.9	7151.3
383	491955.0	3185526.3	9709.7
384	491929.2	3185522.8	8105.7
385	491903.4	3185519.2	31250.9
386	491877.6	3185515.6	57564.3
387	491851.9	3185512.0	13945.0
388	491826.1	3185508.4	20659.3
389	491800.3	3185504.8	39337.2
390	491774.5	3185501.3	9378.3
391	491748.8	3185497.7	15310.4
392	491723.0	3185494.1	16423.9
393	491697.2	3185490.5	45812.8
394	491671.5	3185486.9	82121.3
395	491645.7	3185483.4	62422.7
396	491619.9	3185479.8	36076.1
397	491594.1	3185476.2	75493.3
398	491568.4	3185472.6	39940.3
399	491573.0	3185412.0	25809.3
400	491592.6	3185410.8	28619.6
401	491612.3	3185409.5	100679.9
402	491631.9	3185408.3	63098.8
403	491651.5	3185407.0	37965.1
404	491671.2	3185405.8	48954.5
405	491690.8	3185404.6	41113.5
406	491710.4	3185403.3	62992.7
407	491730.1	3185402.1	212694.3
408	491749.7	3185400.8	88749.4
409	491769.3	3185399.6	26465.4
410	491789.0	3185398.4	24139.0
411	491800.4	3185427.0	33875.6
412	491809.3	3185449.3	19234.2
413	491797.1	3185449.0	17451.3
414	491784.9	3185448.6	23264.1
415	491772.7	3185448.3	13408.2
416	491760.4	3185448.0	16695.7
417	491748.2	3185447.7	17358.5
418	491736.0	3185447.3	22926.1
419	491723.8	3185447.0	56106.2
420	491711.6	3185446.7	7409.7
421	491699.4	3185446.3	117250.1

422	491687.2	3185446.0	16636.0
423	491674.9	3185445.7	1782.5
424	491662.7	3185445.3	2332.6
425	491650.5	3185445.0	3061.7

2^{nd} Quarter 2007

	Receptors, i		
No.	x_r (meters)	y_r (meters)	C_{total} (ug/m^3)
1	491457.1	3185635.3	0.0
2	491488.1	3185635.3	124094.0
3	491519.1	3185635.3	59088.1
4	491550.1	3185635.3	9822.4
5	491581.1	3185635.3	67673.1
6	491612.1	3185635.3	53362.7
7	491643.1	3185635.3	76008.0
8	491674.1	3185635.3	15022.1
9	491705.1	3185635.3	19728.1
10	491736.1	3185635.3	152304.5
11	491767.1	3185635.3	46976.8
12	491798.1	3185635.3	19311.3
13	491829.1	3185635.3	8399.0
14	491860.1	3185635.3	24459.7
15	491891.1	3185635.3	47246.1
16	491922.1	3185635.3	2109.4
17	491953.1	3185635.3	67031.9
18	491984.1	3185635.3	1423.3
19	492015.1	3185635.3	0.0
20	492046.1	3185635.3	0.0
21	492077.1	3185635.3	557.8
22	492108.1	3185635.3	9328.7
23	492139.5	3185635.3	4462.4
24	492134.4	3185610.9	82419.5
25	492129.3	3185586.6	5712.6
26	492124.2	3185562.3	0.0
27	492119.1	3185537.9	0.0
28	492114.1	3185513.6	0.0
29	492109.0	3185489.3	0.0
30	492103.9	3185464.9	0.0
31	492098.8	3185440.6	109.0
32	492092.5	3185410.5	2077.3
33	492065.5	3185421.0	52945.9

34	492032.1	3185431.1	129864.4
35	492024.7	3185405.0	159998.3
36	492017.3	3185378.9	127299.8
37	492009.8	3185352.8	36718.5
38	492002.4	3185326.8	9931.4
39	491995.0	3185300.7	2699.2
40	491987.5	3185274.6	2250.4
41	491980.1	3185248.5	0.0
42	491972.7	3185222.4	13162.7
43	491966.4	3185200.1	0.0
44	491941.8	3185203.7	0.0
45	491917.0	3185207.1	0.0
46	491892.4	3185210.7	0.0
47	491867.9	3185214.2	5167.6
48	491843.4	3185217.8	16894.2
49	491818.8	3185221.4	12816.5
50	491794.3	3185224.9	21407.9
51	491769.7	3185228.5	7360.4
52	491745.2	3185232.1	12220.2
53	491720.6	3185235.7	28383.6
54	491696.1	3185239.2	72802.3
55	491671.5	3185242.8	51086.6
56	491647.0	3185246.4	38097.0
57	491622.4	3185250.0	35679.8
58	491597.9	3185252.5	162562.9
59	491573.4	3185257.1	184361.9
60	491548.8	3185260.7	212572.3
61	491524.3	3185264.2	146534.2
62	491498.5	3185264.0	139481.6
63	491497.8	3185309.8	115759.1
64	491530.9	3185308.0	251041.2
65	491563.9	3185306.2	42591.4
66	491596.9	3185304.4	63185.0
67	491630.0	3185302.6	108065.3
68	491663.0	3185300.8	179873.8
69	491696.0	3185299.0	134993.5
70	491729.1	3185297.2	77931.4
71	491762.1	3185295.4	28107.9
72	491795.1	3185293.6	229242.2

73	491828.1	3185291.8	146534.2
74	491862.0	3185290.0	87548.6
75	491871.0	3185324.0	172180.1
76	491880.7	3185360.2	106141.9
77	491889.4	3185392.2	16746.7
78	491897.2	3185420.7	42476.0
79	491903.6	3185443.3	22638.9
80	491918.2	3185454.7	47374.4
81	491933.5	3185467.0	65749.6
82	491949.5	3185480.0	43149.2
83	491964.0	3185469.5	47182.0
84	491981.5	3185458.5	18926.6
85	492004.2	3185453.8	64467.3
86	492027.9	3185448.6	6719.2
87	492049.0	3185444.5	18618.9
88	492076.6	3185453.5	4699.6
89	492078.9	3185471.5	1019.4
90	492081.5	3185488.0	0.0
91	492085.1	3185509.4	5744.7
92	492088.0	3185531.1	10784.1
93	492091.7	3185557.2	1070.7
94	492095.8	3185581.7	9418.4
95	492099.5	3185604.5	7706.6
96	492069.5	3185603.6	32672.8
97	492039.5	3185602.6	28640.0
98	492009.5	3185601.7	12880.6
99	491979.5	3185600.8	92677.8
100	491949.5	3185599.8	31807.3
101	491919.5	3185598.9	74725.7
102	491889.6	3185598.0	86266.3
103	491859.6	3185597.0	122811.7
104	491829.6	3185596.1	45309.9
105	491799.6	3185595.2	20189.7
106	491769.6	3185594.2	8443.9
107	491739.6	3185593.3	124735.2
108	491709.6	3185592.4	49964.6
109	491679.6	3185591.4	25024.0
110	491649.6	3185590.5	8783.7
111	491619.6	3185589.6	9867.2

112	491589.6	3185588.6	4975.3
113	491559.6	3185587.7	5103.5
114	491529.7	3185586.7	3757.1
115	491499.7	3185585.8	3148.0
116	491457.5	3185584.5	0.0
117	491458.1	3185554.5	12124.1
118	491493.0	3185554.6	10527.6
119	491527.9	3185554.6	18715.1
120	491562.8	3185554.7	45117.5
121	491597.7	3185554.7	61229.5
122	491632.6	3185554.8	47759.0
123	491667.5	3185554.8	66390.8
124	491702.4	3185554.9	46284.4
125	491737.3	3185554.9	7520.6
126	491772.1	3185555.0	78572.6
127	491807.0	3185555.0	37019.8
128	491841.9	3185555.1	84342.9
129	491876.8	3185555.1	27569.3
130	491911.7	3185555.2	79854.9
131	491946.6	3185555.2	79854.9
132	491981.5	3185555.3	5533.1
133	492016.4	3185555.3	4058.4
134	492044.5	3185555.3	6270.4
135	492049.1	3185527.4	1564.4
136	492037.0	3185510.5	2218.4
137	492001.9	3185512.3	6090.9
138	491961.0	3185514.5	3981.5
139	491927.8	3185505.3	7963.0
140	491899.5	3185473.5	16926.3
141	491887.1	3185441.1	29678.7
142	491875.9	3185414.0	16971.2
143	491864.7	3185384.0	27710.4
144	491854.3	3185356.0	6558.9
145	491843.5	3185328.5	58338.0
146	491818.8	3185331.7	13951.3
147	491794.0	3185334.8	8014.3
148	491769.3	3185338.0	53952.5
149	491744.6	3185341.1	14765.6
150	491719.9	3185344.3	20189.7

151	491695.1	3185347.4	36987.8
152	491670.4	3185350.6	11963.8
153	491645.7	3185353.8	15804.3
154	491621.0	3185356.9	11867.6
155	491596.2	3185360.1	22363.2
156	491571.5	3185363.2	33775.6
157	491546.8	3185366.4	44495.6
158	491522.1	3185369.5	53997.4
159	491495.0	3185373.0	54914.2
160	491493.5	3185390.5	9963.4
161	491492.5	3185408.0	30351.9
162	491528.6	3185407.6	14624.6
163	491564.7	3185407.2	90113.2
164	491600.9	3185406.8	18080.3
165	491637.0	3185406.4	12367.7
166	491673.1	3185406.0	3468.6
167	491709.2	3185405.6	7597.6
168	491745.3	3185405.2	22158.0
169	491781.5	3185404.8	5757.5
170	491817.6	3185404.4	3340.4
171	491855.0	3185404.0	13996.2
172	491856.4	3185427.6	4122.6
173	491858.5	3185447.5	33275.5
174	491831.7	3185450.1	38398.3
175	491804.9	3185452.6	13547.4
176	491778.2	3185455.2	31518.8
177	491751.4	3185457.7	16958.3
178	491724.6	3185460.3	9245.3
179	491697.8	3185462.8	24812.4
180	491671.0	3185465.4	17387.9
181	491644.3	3185467.9	28255.3
182	491617.5	3185470.5	19599.9
183	491590.7	3185473.0	24363.6
184	491563.9	3185475.6	22267.0
185	491537.2	3185478.1	17952.1
186	491507.0	3185481.0	12893.5
187	491339.0	3185019.0	5680.5
188	491337.3	3185051.4	7757.9
189	491336.0	3185081.8	3212.1

190	491345.1	3185068.5	4314.9
191	491354.2	3185055.2	4154.6
192	491363.2	3185041.9	12688.3
193	491372.3	3185028.6	8860.6
194	491381.4	3185015.3	4795.8
195	491390.5	3185002.0	4205.9
196	491399.6	3184988.7	4943.2
197	491408.6	3184975.4	3468.6
198	491416.9	3184963.4	4411.1
199	491393.2	3184966.6	3148.0
200	491367.6	3184970.3	4205.9
201	491347.9	3184981.4	8091.3
202	491326.7	3184993.5	8334.9
203	491306.0	3185005.5	7866.9
204	491306.2	3185061.9	6732.0
205	491306.4	3185109.3	6571.7
206	491335.7	3185123.6	5533.1
207	491362.0	3185136.0	6462.7
208	491377.2	3185116.5	6751.3
209	491392.4	3185096.9	10796.9
210	491407.5	3185077.4	7373.2
211	491422.7	3185057.9	5853.7
212	491437.9	3185038.3	20016.6
213	491453.1	3185018.8	40257.6
214	491468.3	3184999.3	28928.5
215	491483.4	3184979.8	12303.6
216	491498.6	3184960.2	11168.8
217	491512.0	3184943.0	7738.6
218	491537.0	3184923.0	9245.3
219	491509.5	3184913.1	7982.3
220	491480.5	3184902.9	17355.8
221	491451.9	3184892.6	176027.0
222	491411.5	3184901.0	7674.5
223	491388.5	3184913.2	8924.8
224	491365.7	3184924.9	5231.7
225	491345.5	3184935.2	7802.7
226	491322.5	3184947.2	8270.8
227	491300.1	3184959.5	6635.9
228	491292.2	3185000.7	6892.3

229	491284.3	3185041.8	7584.8
230	491276.4	3185083.0	4539.3
231	491268.5	3185124.2	5885.7
232	491261.5	3185160.5	5520.3
233	491276.6	3185168.1	2622.3
234	491294.6	3185177.0	4270.0
235	491311.8	3185186.1	4603.4
236	491331.1	3185195.7	2718.4
237	491346.1	3185203.1	2442.8
238	491370.4	3185173.6	13246.1
239	491394.6	3185144.1	15374.7
240	491418.9	3185114.5	19420.3
241	491443.2	3185085.0	21036.0
242	491467.4	3185055.5	17567.4
243	491491.7	3185025.9	18509.9
244	491515.9	3184996.4	17631.5
245	491540.2	3184966.9	9630.0
246	491564.5	3184937.3	8078.4
247	491588.7	3184907.8	8508.0
248	491606.8	3184885.8	7757.9
249	491535.7	3184868.1	6796.1
250	491450.1	3184846.8	98448.1
251	491330.0	3184878.5	6751.3
252	491255.7	3184929.3	3148.0
253	491248.4	3184981.4	5052.2
254	491237.6	3185053.6	6796.1
255	491223.9	3185130.3	1743.9
256	491211.5	3185204.0	2410.7
257	491216.0	3185261.0	2045.2
258	491235.8	3185263.1	3116.0
259	491256.9	3185265.5	1743.9
260	491278.5	3185268.0	2718.4
261	491299.5	3185270.4	621.9
262	491319.9	3185272.4	1596.4
263	491339.5	3185274.1	846.3
264	491352.0	3185259.5	1340.0
265	491364.5	3185244.8	1340.0
266	491377.0	3185230.2	2173.5
267	491389.5	3185215.5	1243.8

268	491402.0	3185200.9	11258.5
269	491414.5	3185186.3	6623.0
270	491427.0	3185171.6	2635.1
271	491439.5	3185157.0	3007.0
272	491452.0	3185142.3	1840.1
273	491464.5	3185127.7	2090.1
274	491477.0	3185113.1	7866.9
275	491489.5	3185098.4	5167.6
276	491502.0	3185083.8	7180.8
277	491514.5	3185069.1	7950.2
278	491527.0	3185054.5	8014.3
279	491539.5	3185039.8	11213.6
280	491552.0	3185025.2	17997.0
281	491564.5	3185010.6	38622.7
282	491577.0	3184995.9	38109.8
283	491589.5	3184981.3	11739.4
284	491602.0	3184966.6	6078.1
285	491614.5	3184952.0	2942.8
286	491627.0	3184937.4	3276.2
287	491639.5	3184922.7	10187.8
288	491652.0	3184908.1	3744.3
289	491664.5	3184893.4	3487.8
290	491677.0	3184878.8	3051.8
291	491687.5	3184866.5	2365.8
292	491658.8	3184816.4	2077.3
293	491601.2	3184808.2	1808.0
294	491534.5	3184799.0	3532.7
295	491477.6	3184804.7	1179.7
296	491416.5	3184810.3	5404.9
297	491357.6	3184815.9	2282.5
298	491306.6	3184821.2	4090.5
299	491255.4	3184852.2	1808.0
300	491208.6	3184881.1	2494.0
301	491205.8	3184896.0	2494.0
302	491201.8	3184917.6	1692.6
303	491197.8	3184939.1	1583.6
304	491193.8	3184960.6	2378.6
305	491189.8	3184982.1	1904.2
306	491185.8	3185003.6	1243.8

307	491181.7	3185025.1	2365.8
308	491177.7	3185046.7	1808.0
309	491173.7	3185068.2	2795.4
310	491169.7	3185089.7	3231.4
311	491165.7	3185111.2	4141.8
312	491161.7	3185132.7	4173.9
313	491157.7	3185154.2	2686.4
314	491153.7	3185175.8	3327.5
315	491149.7	3185197.3	2923.6
316	491145.7	3185218.8	2250.4
317	491141.7	3185240.3	2154.2
318	491137.7	3185261.8	2462.0
319	491133.7	3185283.3	1423.3
320	491129.7	3185304.9	2077.3
321	491175.1	3185305.9	2141.4
322	491219.4	3185306.6	2301.7
323	491280.4	3185307.6	2365.8
324	491335.2	3185309.5	3584.0
325	491408.5	3185311.0	3519.9
326	491420.3	3185294.4	4334.1
327	491432.2	3185277.9	4475.2
328	491444.0	3185261.3	9963.4
329	491455.8	3185244.7	5552.3
330	491467.6	3185228.1	3885.3
331	491479.5	3185211.6	2269.6
332	491491.3	3185195.0	6110.1
333	491503.1	3185178.4	3962.3
334	491515.0	3185161.9	7020.5
335	491526.8	3185145.3	7789.9
336	491538.6	3185128.7	6558.9
337	491550.5	3185112.1	4782.9
338	491562.3	3185095.6	5116.3
339	491574.1	3185079.0	4590.6
340	491585.9	3185062.4	4186.7
341	491597.8	3185045.8	4622.7
342	491609.6	3185029.3	5565.1
343	491621.4	3185012.7	4141.8
344	491633.3	3184996.1	9117.1
345	491645.1	3184979.6	8687.5

346	491656.9	3184963.0	6751.3
347	491668.7	3184946.4	10046.8
348	491680.6	3184929.8	4988.1
349	491692.4	3184913.3	10142.9
350	491704.2	3184896.7	9117.1
351	491716.1	3184880.1	3083.9
352	491727.9	3184863.6	3116.0
353	491739.7	3184847.0	15054.1
354	491751.6	3184830.4	7232.1
355	491763.4	3184813.8	6911.6
356	491775.2	3184797.3	13194.8
357	491787.0	3184780.7	5533.1
358	491798.9	3184764.1	5135.6

2nd Quarter 2008

	Receptors, i		
No.	x_r (meters)	y_r (meters)	C_{total} (ug/m^3)
1	491481.2	3185636.1	2302.7
2	491507.5	3185635.7	2507.2
3	491533.7	3185635.2	10523.7
4	491559.9	3185634.8	13644.5
5	491586.2	3185634.4	8478.4
6	491612.4	3185634.0	4922.1
7	491638.6	3185633.6	9633.0
8	491664.9	3185633.1	6380.2
9	491691.1	3185632.7	18269.7
10	491717.3	3185632.3	20559.2
11	491743.6	3185631.9	14799.2
12	491769.8	3185631.5	1339.4
13	491796.0	3185631.0	2388.5
14	491822.3	3185630.6	1583.5
15	491848.5	3185630.2	5291.5
16	491874.7	3185629.8	4974.8
17	491901.0	3185629.4	5812.8
18	491927.2	3185628.9	1352.6
19	491953.4	3185628.5	7805.4
20	491979.7	3185628.1	4776.9
21	492005.8	3185627.7	910.5
22	492032.1	3185627.3	1972.8
23	492058.4	3185626.8	3496.9
24	492084.6	3185626.4	1755.1
25	492110.8	3185626.0	2111.3
26	492126.9	3185608.9	9692.4
27	492127.6	3185582.7	14601.2
28	492121.1	3185557.7	5021.0
29	492111.8	3185533.2	2335.7
30	492102.4	3185508.7	983.1
31	492095.2	3185483.5	1398.8
32	492088.9	3185458.0	44536.1
33	492082.6	3185432.6	758.8
34	492072.5	3185410.6	963.3
35	492049.1	3185415.9	2738.1

36	492025.2	3185425.1	574.0
37	491999.0	3185425.9	126680.4
38	491972.9	3185430.1	253360.8
39	491960.3	3185412.4	149773.2
40	491952.7	3185387.4	108206.2
41	491945.0	3185362.3	88412.4
42	491937.4	3185337.2	79835.1
43	491929.7	3185312.1	7330.3
44	491922.0	3185287.0	8709.3
45	491913.7	3185262.2	4229.3
46	491897.3	3185241.7	1240.4
47	491872.6	3185238.6	1774.8
48	491846.5	3185239.8	1398.8
49	491821.2	3185246.6	5924.9
50	491795.8	3185253.3	4552.6
51	491770.4	3185260.0	2025.6
52	491745.1	3185266.7	12925.4
53	491726.3	3185254.8	5034.2
54	491709.0	3185237.3	4532.8
55	491682.9	3185239.8	6373.6
56	491656.9	3185242.7	4156.7
57	491631.7	3185250.1	2091.5
58	491606.5	3185257.4	6670.5
59	491581.3	3185264.8	37924.9
60	491556.2	3185272.2	4117.1
61	491531.0	3185279.6	213113.4
62	491505.8	3185286.9	27012.0
63	491480.6	3185294.3	144494.8
64	491465.3	3185308.1	64560.8
65	491476.8	3185321.6	44489.9
66	491502.0	3185314.2	44905.6
67	491527.2	3185306.8	54756.3
68	491552.3	3185299.3	13024.3
69	491577.5	3185291.9	163628.9
70	491602.6	3185284.5	9804.5
71	491628.2	3185278.7	76536.1
72	491654.1	3185274.6	31848.2
73	491680.5	3185270.0	131958.8
74	491703.3	3185285.4	176164.9
75	491726.8	3185297.5	116783.5

76	491754.2	3185294.8	48514.6
77	491781.0	3185289.5	87752.6
78	491807.7	3185283.1	163628.9
79	491834.5	3185276.8	137896.9
80	491860.3	3185274.5	106226.8
81	491881.9	3185291.4	41190.9
82	491894.7	3185314.0	45492.8
83	491901.1	3185340.7	149773.2
84	491907.5	3185367.4	36493.2
85	491913.9	3185394.1	12760.4
86	491920.3	3185420.8	22762.9
87	491926.7	3185447.5	19602.5
88	491948.6	3185462.2	166268.0
89	491976.0	3185463.3	176824.7
90	492002.6	3185457.7	75876.3
91	492029.6	3185456.0	124701.0
92	492052.9	3185466.5	37133.2
93	492070.5	3185487.5	22551.8
94	492078.7	3185513.6	11553.0
95	492087.0	3185539.8	4453.6
96	492091.3	3185566.6	3101.0
97	492085.3	3185590.7	2434.6
98	492059.7	3185598.9	2197.1
99	492032.4	3185601.8	2520.4
100	492005.1	3185604.7	59995.1
101	491977.8	3185607.5	33326.2
102	491950.5	3185610.4	14654.0
103	491923.1	3185610.6	20809.9
104	491895.7	3185609.2	24656.5
105	491868.2	3185607.9	12879.2
106	491840.8	3185606.5	56023.1
107	491813.4	3185605.1	18698.6
108	491786.0	3185604.5	89072.2
109	491758.6	3185606.6	44740.6
110	491731.2	3185608.7	6261.4
111	491703.8	3185610.7	30020.6
112	491676.5	3185612.8	12212.8
113	491649.1	3185614.9	21502.7
114	491621.7	3185616.1	29578.6
115	491594.3	3185614.4	12991.3

116	491566.9	3185612.8	5938.1
117	491539.5	3185611.1	7244.5
118	491512.1	3185609.4	3483.7
119	491484.7	3185607.7	2942.7
120	491457.3	3185606.1	2414.8
121	491451.4	3185587.7	13063.9
122	491462.5	3185572.8	48211.1
123	491487.7	3185582.1	107546.4
124	491515.1	3185580.4	38960.8
125	491542.5	3185578.6	28423.9
126	491569.9	3185576.8	11414.4
127	491597.3	3185575.1	12734.0
128	491624.3	3185570.7	41705.6
129	491651.2	3185565.0	10510.5
130	491678.2	3185567.8	5608.2
131	491705.5	3185569.5	23495.3
132	491732.9	3185568.5	29110.1
133	491760.3	3185567.4	7633.8
134	491787.8	3185566.4	14014.0
135	491815.2	3185565.3	49596.7
136	491842.6	3185563.0	46739.8
137	491869.0	3185563.4	89072.2
138	491892.6	3185572.4	27579.4
139	491920.0	3185571.1	10629.3
140	491947.4	3185569.7	91711.3
141	491974.6	3185566.3	3602.5
142	492001.9	3185563.0	16178.1
143	492029.2	3185559.6	4618.6
144	492044.7	3185544.2	4836.3
145	492043.2	3185517.9	10042.1
146	492024.8	3185501.2	3219.8
147	491998.1	3185495.0	3107.6
148	491999.4	3185516.6	8729.1
149	491997.2	3185539.4	2447.8
150	491972.6	3185551.6	3925.8
151	491948.0	3185563.8	3906.0
152	491921.6	3185569.0	2560.0
153	491894.2	3185570.6	9243.7
154	491870.3	3185562.7	17444.9
155	491845.1	3185556.6	8649.9

156	491828.6	3185535.6	5845.8
157	491804.2	3185530.8	3826.8
158	491776.8	3185531.2	4453.6
159	491749.3	3185531.7	3015.3
160	491721.9	3185532.1	5647.8
161	491694.4	3185532.5	3919.2
162	491667.0	3185532.9	5456.5
163	491639.5	3185533.3	9666.0
164	491612.1	3185533.9	6729.9
165	491584.6	3185534.8	16996.3
166	491557.2	3185535.6	153072.2
167	491529.7	3185536.4	29413.6
168	491502.3	3185537.2	75876.3
169	491474.8	3185538.0	19299.0
170	491447.4	3185538.9	61618.1
171	491443.0	3185515.9	31795.5
172	491461.5	3185506.7	26781.0
173	491489.0	3185506.2	10154.2
174	491516.4	3185505.7	10372.0
175	491543.9	3185505.2	21740.2
176	491571.3	3185504.4	37601.6
177	491598.8	3185504.3	64250.7
178	491626.2	3185503.8	44437.1
179	491653.7	3185503.3	8874.2
180	491681.1	3185502.3	14825.6
181	491708.6	3185502.4	21990.9
182	491736.0	3185501.9	61723.7
183	491763.5	3185501.7	7449.1
184	491790.9	3185503.0	33807.8
185	491818.4	3185504.3	21628.0
186	491824.3	3185482.2	38195.5
187	491805.3	3185468.2	9144.7
188	491777.8	3185469.6	9151.3
189	491750.4	3185471.0	33642.9
190	491723.0	3185472.4	20869.3
191	491695.6	3185474.1	30640.8
192	491668.3	3185476.9	38439.6
193	491641.0	3185479.7	11678.4
194	491613.6	3185479.0	29717.1
195	491586.1	3185477.8	9441.6

196	491558.7	3185476.7	27427.6
197	491531.3	3185475.5	38809.1
198	491503.9	3185474.4	34348.9
199	491476.4	3185473.3	45195.9
200	491449.0	3185472.1	69938.1
201	491449.4	3185447.7	41151.3
202	491472.7	3185443.6	30251.5
203	491500.1	3185444.4	31102.7
204	491527.6	3185445.2	21753.4
205	491555.0	3185445.9	19879.6
206	491582.5	3185446.7	31274.2
207	491609.9	3185447.4	87092.8
208	491637.4	3185448.2	29611.5
209	491664.8	3185449.0	107546.4
210	491692.1	3185448.1	124701.0
211	491719.1	3185443.1	262597.9
212	491746.1	3185438.1	6360.4
213	491773.1	3185433.1	158350.5
214	491799.9	3185436.0	24742.3
215	491822.8	3185431.4	44648.2
216	491831.9	3185409.5	178804.1
217	491808.4	3185404.3	88412.4
218	491781.0	3185406.1	50190.5
219	491753.6	3185407.9	71257.7
220	491726.2	3185409.7	40234.2
221	491698.8	3185411.5	19991.8
222	491671.4	3185412.8	0.0
223	491643.9	3185413.9	0.0
224	491616.5	3185414.9	0.0
225	491589.1	3185416.0	0.0
226	491561.6	3185417.1	0.0
227	491534.2	3185418.2	0.0
228	491506.8	3185419.3	0.0
229	491479.3	3185420.4	0.0
230	491451.9	3185421.5	0.0
231	491459.2	3185395.5	0.0
232	491485.9	3185393.3	0.0
233	491513.3	3185392.1	0.0
234	491540.7	3185390.8	0.0
235	491568.1	3185389.6	0.0

236	491595.6	3185388.3	0.0
237	491623.0	3185387.1	0.0
238	491650.4	3185385.9	0.0
239	491677.9	3185384.6	0.0
240	491705.3	3185383.4	0.0
241	491732.7	3185382.1	0.0
242	491760.1	3185380.9	0.0
243	491787.6	3185380.5	0.0
244	491815.0	3185380.5	0.0
245	491842.5	3185380.5	37766.6
246	491870.0	3185380.5	58682.1
247	491877.9	3185365.6	131958.8
248	491861.2	3185351.4	235546.4
249	491833.8	3185351.1	32752.2
250	491806.3	3185350.8	96329.9
251	491778.9	3185350.5	38736.5
252	491751.4	3185350.2	25804.5
253	491723.9	3185350.2	39930.7
254	491696.5	3185351.3	33867.2
255	491669.1	3185352.3	62884.9
256	491641.6	3185353.3	67299.0
257	491614.2	3185354.3	40828.0
258	491586.8	3185355.3	86433.0
259	491559.3	3185356.3	171546.4
260	491531.9	3185357.3	43282.5
261	491504.4	3185358.3	123381.4
262	491477.0	3185359.3	70597.9
263	491460.3	3185351.9	33959.6
264	491473.3	3185331.8	109525.8
265	491500.4	3185327.5	29545.6
266	491527.8	3185325.7	22162.5
267	491555.2	3185325.3	43117.5
268	491582.7	3185324.9	81154.6
269	491610.1	3185324.4	151092.8
270	491637.6	3185324.0	66639.2
271	491665.0	3185323.6	120742.3
272	491692.5	3185323.1	152412.4
273	491719.9	3185322.7	187381.4
274	491747.4	3185322.3	39752.6
275	491774.8	3185321.8	61268.5

276	491802.3	3185321.4	151092.8
277	491829.7	3185321.0	52117.1
278	491857.2	3185320.5	69938.1
279	491853.7	3185296.0	59513.4
280	491827.1	3185296.3	117443.3
281	491799.7	3185297.7	124701.0
282	491772.3	3185299.0	95010.3
283	491744.9	3185300.5	60859.4
284	491717.4	3185301.8	53021.0
285	491690.0	3185303.2	21740.2
286	491664.0	3185295.6	65840.8
287	491637.2	3185296.9	166268.0
288	491610.1	3185301.2	187381.4
289	491583.0	3185305.5	40366.2
290	491418.0	3184969.0	8867.6
291	491381.6	3185010.6	3510.1
292	491349.0	3185055.7	4974.8
293	491314.2	3185098.9	4235.9
294	491287.8	3185124.9	5265.2
295	491301.8	3185071.3	5278.4
296	491335.5	3185027.2	4823.1
297	491373.8	3184987.0	8709.3
298	491416.2	3184953.8	5733.6
299	491468.9	3184936.6	18401.6
300	491455.2	3184974.2	3569.5
301	491420.4	3185017.4	2672.2
302	491384.6	3185059.9	14997.1
303	491348.8	3185102.3	4499.8
304	491313.1	3185144.9	8353.0
305	491269.5	3185179.1	5034.2
306	491244.7	3185228.1	9560.4
307	491251.4	3185174.2	16923.7
308	491259.7	3185119.5	3701.4
309	491275.7	3185067.1	18540.2
310	491303.1	3185019.0	10180.6
311	491342.7	3184980.1	15109.3
312	491378.5	3184940.0	6875.1
313	491428.8	3184917.7	8742.3
314	491483.4	3184907.5	3371.5
315	491538.6	3184900.8	2903.1

316	491517.3	3184940.5	4156.7
317	491483.0	3184984.1	5153.0
318	491445.0	3185024.5	5126.6
319	491410.0	3185067.7	7937.3
320	491375.9	3185111.5	3041.6
321	491343.6	3185156.7	2955.9
322	491312.0	3185202.4	2692.0
323	491280.2	3185248.0	3985.2
324	491242.9	3185287.0	6116.3
325	491213.7	3185265.2	10484.1
326	491220.0	3185210.0	3239.6
327	491226.3	3185154.8	6703.5
328	491236.7	3185100.3	3945.6
329	491249.9	3185046.3	3120.8
330	491271.2	3184997.1	2738.1
331	491314.1	3184961.8	3081.2
332	491352.9	3184922.1	2692.0
333	491395.0	3184886.4	2764.5
334	491448.0	3184870.0	2698.6
335	491497.4	3184873.7	5489.5
336	491553.0	3184872.5	5938.1
337	491608.0	3184868.5	3404.5
338	491614.9	3184888.8	6690.3
339	491574.3	3184926.5	6756.3
340	491535.1	3184965.8	3780.6
341	491497.7	3185006.9	25362.5
342	491464.2	3185051.1	7435.9
343	491431.8	3185096.3	2586.4
344	491399.4	3185141.4	2903.1
345	491367.0	3185186.5	5265.2
346	491332.9	3185230.3	3952.2
347	491297.1	3185272.8	3490.3
348	491259.8	3185313.1	3958.8
349	491206.5	3185317.4	4255.7
350	491183.2	3185272.7	2790.9
351	491183.8	3185217.3	2738.1
352	491186.7	3185161.8	5938.1
353	491197.6	3185107.4	4262.3
354	491210.4	3185053.3	6842.1
355	491222.1	3184999.1	5271.8

356	491253.3	3184953.4	3107.6
357	491300.3	3184925.9	13162.9
358	491339.0	3184887.3	3041.6
359	491378.8	3184851.0	3206.6
360	491428.2	3184825.9	2876.7
361	491483.5	3184821.1	2692.0
362	491538.3	3184823.3	3430.9
363	491592.7	3184825.1	3589.3
364	491647.9	3184819.3	3569.5
365	491702.5	3184821.0	2256.5
366	491677.6	3184865.6	8933.6
367	491648.8	3184913.1	3167.0
368	491616.7	3184957.6	2692.0
369	491581.9	3185000.2	38109.7
370	491542.4	3185039.0	4552.6
371	491501.6	3185076.7	4526.2
372	491464.1	3185117.4	3299.0
373	491431.3	3185162.2	2388.5
374	491396.5	3185205.5	4499.8
375	491361.4	3185248.5	4037.9
376	491321.0	3185286.6	6499.0
377	491348.9	3185310.3	7336.9
378	491390.8	3185274.2	7765.8
379	491422.8	3185228.9	16125.4
380	491457.9	3185186.3	4229.3
381	491489.3	3185141.8	3879.6
382	491524.7	3185099.0	3437.5
383	491569.4	3185066.2	3483.7
384	491608.7	3185027.0	4941.9
385	491643.7	3184983.9	4783.5
386	491677.3	3184939.7	4420.6
387	491708.5	3184893.7	3727.8
388	491735.4	3184845.4	3793.8
389	491731.3	3184796.8	3569.5
390	491676.6	3184787.3	3972.0
391	491621.0	3184787.0	4374.4
392	491565.5	3184788.5	4097.3
393	491510.1	3184793.0	3767.4
394	491454.8	3184797.4	4222.7
395	491401.2	3184811.8	3767.4

396	491352.4	3184836.4	3892.8
397	491305.9	3184866.4	3925.8
398	491255.9	3184890.3	3866.4
399	491217.8	3184929.7	3853.2
400	491187.0	3184975.0	3516.7
401	491171.6	3185028.0	3266.0
402	491166.0	3185083.3	3496.9
403	491159.0	3185138.3	3840.0
404	491150.4	3185192.9	4288.7
405	491137.8	3185246.5	4387.6
406	491135.4	3185301.6	4341.4
407	491156.4	3185349.0	4552.6
408	491196.3	3185373.4	4750.5
409	491171.6	3185412.4	4288.7
410	491125.4	3185386.8	4070.9
411	491095.8	3185340.9	3457.3
412	491086.3	3185287.0	3688.2
413	491095.5	3185232.3	3239.6
414	491104.7	3185177.5	4334.8
415	491114.0	3185122.7	3813.6
416	491123.4	3185067.9	3958.8
417	491133.1	3185013.3	3325.4
418	491147.0	3184959.5	3299.0
419	491166.6	3184907.6	3094.4
420	491207.5	3184873.9	3120.8
421	491256.4	3184847.6	3239.6
422	491306.6	3184823.8	3655.3
423	491357.0	3184800.4	2955.9
424	491409.7	3184783.1	2903.1
425	491463.6	3184770.6	3021.9
426	491518.8	3184764.2	3351.8
427	491574.0	3184757.8	3120.8
428	491629.2	3184751.4	3206.6
429	491684.4	3184745.0	3074.6
430	491739.9	3184745.9	2975.7
431	491787.6	3184761.0	2751.3
432	491787.6	3184810.5	2711.8
433	491759.1	3184857.9	3272.6
434	491727.9	3184903.9	3140.6
435	491696.7	3184949.9	2929.5

436	491661.3	3184992.7	2903.1
437	491625.4	3185035.0	3299.0
438	491589.4	3185077.3	3332.0
439	491553.4	3185119.7	4143.5
440	491517.4	3185162.0	4513.0
441	491481.5	3185204.3	4915.5
442	491445.5	3185246.7	4282.1

APPENDIX C:
OUTPUT OF PREDICTED METHANE EMISSIONS FROM MATLAB

MATLAB Predicted Methane Emissions 4th Quarter 2006:

Sources Processed by MATLAB (178)	X-Coordinate (UTM km)	Y-Coordinate (UTM km)	Predicted Methane Emissions (ug/s)	Predicted Methane Emissions (g/s)
1	491.96	3185.60	2.21E+06	2.2
2	492.02	3185.39	1.32E+05	0.1
3	492.00	3185.42	2.08E+05	0.2
4	491.84	3185.60	5.12E+06	5.1
5	492.07	3185.53	9.61E+05	1.0
6	491.16	3185.28	2.02E+06	2.0
7	491.14	3185.08	1.81E+06	1.8
8	491.94	3185.41	2.88E+06	2.9
9	492.08	3185.60	2.43E+06	2.4
10	491.92	3185.53	2.47E+06	2.5
11	491.96	3185.56	3.11E+05	0.3
12	491.93	3185.56	1.05E+06	1.0
13	492.01	3185.46	7.19E+06	7.2
14	492.07	3185.52	2.76E+05	0.3
15	492.07	3185.50	6.31E+05	0.6
16	492.06	3185.45	4.90E+06	4.9
17	491.48	3185.60	3.65E+06	3.6
18	491.23	3185.30	4.71E+06	4.7
19	491.27	3184.84	3.00E+06	3.0
20	491.24	3184.90	9.55E+06	9.6
21	491.21	3184.88	4.71E+06	4.7
22	491.81	3185.55	1.11E+05	0.1
23	491.72	3185.60	3.51E+06	3.5
24	491.78	3185.60	1.37E+07	13.7
25	491.95	3185.43	5.35E+06	5.3
26	491.67	3185.30	2.02E+05	0.2
27	492.01	3185.60	9.18E+05	0.9
28	492.01	3185.56	1.64E+04	0.0
29	491.98	3185.56	1.57E+06	1.6
30	491.90	3185.60	6.09E+06	6.1
31	491.96	3185.50	5.89E+04	0.1
32	491.20	3185.30	9.85E+05	1.0
33	491.18	3185.28	2.80E+06	2.8
34	491.54	3185.60	7.53E+06	7.5
35	491.60	3185.60	2.40E+06	2.4
36	491.59	3184.71	2.67E+06	2.7
37	491.63	3184.70	1.60E+06	1.6
38	491.28	3184.84	1.28E+06	1.3
39	491.94	3185.38	5.95E+06	6.0

40	491.78	3185.55	1.52E+06	1.5
41	491.95	3185.46	1.59E+06	1.6
42	491.90	3185.30	1.79E+06	1.8
43	491.82	3185.30	1.32E+06	1.3
44	491.88	3185.43	2.69E+06	2.7
45	491.71	3185.30	1.34E+06	1.3
46	492.04	3185.57	1.44E+04	0.0
47	492.08	3185.55	1.01E+06	1.0
48	491.87	3185.53	3.73E+06	3.7
49	491.99	3185.50	3.48E+05	0.3
50	492.03	3185.50	7.59E+04	0.1
51	491.13	3185.11	1.05E+06	1.1
52	491.32	3184.93	2.46E+05	0.2
53	491.53	3185.53	2.37E+06	2.4
54	491.66	3185.60	1.35E+06	1.4
55	491.67	3184.79	2.92E+05	0.3
56	491.74	3184.81	5.22E+05	0.5
57	491.43	3185.09	4.87E+06	4.9
58	491.52	3184.91	2.09E+05	0.2
59	491.60	3185.01	6.14E+05	0.6
60	491.60	3184.76	3.10E+05	0.3
61	491.64	3184.76	1.42E+06	1.4
62	491.46	3184.89	2.26E+04	0.0
63	491.40	3184.90	4.36E+03	0.0
64	491.48	3184.83	4.63E+05	0.5
65	491.47	3184.97	4.49E+06	4.5
66	491.23	3185.02	7.23E+05	0.7
67	491.19	3184.92	1.32E+07	13.2
68	491.55	3185.07	8.11E+05	0.8
69	491.70	3184.97	1.74E+05	0.2
70	491.73	3184.83	3.58E+06	3.6
71	491.66	3185.47	1.48E+06	1.5
72	491.69	3185.47	3.86E+06	3.9
73	491.70	3185.54	1.78E+06	1.8
74	491.78	3185.52	1.07E+04	0.0
75	491.76	3185.55	8.18E+05	0.8
76	491.92	3185.50	1.20E+05	0.1
77	491.90	3185.48	1.60E+06	1.6
78	491.90	3185.32	1.13E+06	1.1
79	491.85	3185.34	1.61E+06	1.6
80	491.85	3185.29	1.26E+06	1.3
81	491.80	3185.44	1.60E+05	0.2
82	491.37	3185.21	1.36E+06	1.4
83	491.69	3185.35	3.52E+06	3.5
84	492.08	3185.55	8.74E+05	0.9
85	491.19	3185.23	5.53E+05	0.6
86	491.12	3185.14	3.22E+06	3.2
87	491.11	3185.17	5.05E+06	5.0

88	491.14	3185.26	3.02E+05	0.3
89	491.11	3185.21	1.26E+06	1.3
90	491.45	3185.12	5.25E+05	0.5
91	491.29	3185.21	1.10E+05	0.1
92	491.38	3184.93	6.25E+05	0.6
93	491.45	3185.50	2.77E+06	2.8
94	491.45	3185.52	1.43E+06	1.4
95	491.45	3185.59	3.40E+06	3.4
96	491.36	3184.81	3.20E+05	0.3
97	491.36	3184.82	4.65E+05	0.5
98	491.53	3184.86	7.56E+04	0.1
99	491.41	3184.92	8.40E+04	0.1
100	491.24	3184.99	8.59E+04	0.1
101	491.88	3185.41	3.05E+06	3.0
102	491.82	3185.41	2.29E+06	2.3
103	491.73	3185.54	1.82E+05	0.2
104	491.92	3185.51	1.07E+06	1.1
105	491.92	3185.36	3.64E+06	3.6
106	491.90	3185.34	1.28E+06	1.3
107	491.86	3185.36	1.22E+06	1.2
108	491.87	3185.38	2.19E+06	2.2
109	491.74	3185.30	2.85E+06	2.9
110	491.78	3185.29	3.91E+06	3.9
111	491.72	3185.35	5.51E+06	5.5
112	491.74	3185.34	7.82E+05	0.8
113	491.77	3185.34	2.59E+06	2.6
114	491.77	3185.38	7.74E+06	7.7
115	491.89	3185.46	5.13E+06	5.1
116	491.83	3185.48	2.54E+06	2.5
117	491.50	3185.20	2.77E+06	2.8
118	491.47	3185.23	4.72E+06	4.7
119	491.64	3185.46	2.47E+05	0.2
120	491.16	3185.17	8.76E+04	0.1
121	491.23	3185.06	2.55E+05	0.3
122	491.12	3185.26	4.58E+05	0.5
123	491.15	3185.04	2.53E+06	2.5
124	491.36	3184.95	9.96E+04	0.1
125	491.50	3185.53	9.08E+06	9.1
126	491.40	3185.55	3.14E+07	31.4
127	491.44	3185.55	1.67E+06	1.7
128	491.54	3184.88	2.09E+05	0.2
129	491.60	3184.86	5.19E+04	0.1
130	491.75	3185.38	1.53E+07	15.3
131	491.80	3185.34	2.81E+06	2.8
132	491.82	3185.34	6.11E+05	0.6
133	491.80	3185.38	1.93E+06	1.9
134	491.78	3185.47	2.05E+04	0.0
135	491.62	3185.35	9.92E+06	9.9

136	491.63	3185.30	4.97E+06	5.0
137	491.56	3185.30	6.40E+06	6.4
138	491.52	3185.20	1.91E+05	0.2
139	491.58	3185.53	3.41E+06	3.4
140	491.67	3185.35	3.15E+04	0.0
141	491.64	3185.35	5.24E+06	5.2
142	491.62	3185.44	8.48E+06	8.5
143	491.15	3185.01	4.96E+06	5.0
144	491.17	3184.98	3.47E+06	3.5
145	491.28	3185.05	5.96E+05	0.6
146	491.28	3185.07	2.80E+06	2.8
147	491.65	3185.54	9.59E+05	1.0
148	491.68	3185.54	1.17E+06	1.2
149	491.61	3185.53	1.02E+05	0.1
150	491.42	3185.59	1.57E+07	15.7
151	491.40	3185.59	1.16E+07	11.6
152	491.58	3185.03	5.59E+06	5.6
153	491.55	3184.94	6.17E+06	6.2
154	491.72	3185.47	2.27E+06	2.3
155	491.72	3185.42	1.59E+06	1.6
156	491.60	3185.30	4.72E+06	4.7
157	491.59	3185.36	1.09E+07	10.9
158	491.44	3185.33	3.56E+06	3.6
159	491.48	3185.38	2.70E+06	2.7
160	491.49	3185.36	2.82E+07	28.2
161	491.41	3185.38	3.23E+07	32.3
162	491.46	3185.42	4.46E+06	4.5
163	491.53	3185.25	1.52E+06	1.5
164	491.54	3185.36	2.82E+07	28.2
165	491.53	3185.30	1.39E+06	1.4
166	491.74	3185.42	7.99E+04	0.1
167	491.75	3185.42	1.75E+06	1.8
168	491.74	3185.47	2.09E+05	0.2
169	491.45	3185.47	8.12E+06	8.1
170	491.54	3185.43	1.65E+07	16.5
171	491.54	3185.47	1.79E+06	1.8
172	491.56	3185.49	3.82E+06	3.8
173	491.56	3185.53	1.59E+06	1.6
174	491.50	3185.30	4.64E+06	4.6
175	491.64	3185.40	3.64E+06	3.6
176	491.62	3185.39	4.51E+06	4.5
177	491.68	3185.39	2.03E+06	2.0
178	491.45	3185.25	1.73E+07	17.3

MATLAB Predicted Methane Emissions 2nd Quarter 2007:

Sources Processed by MATLAB (108)	X-Coordinate (UTM km)	Y-Coordinate (UTM km)	Predicted Methane Emissions (ug/s)	Predicted Methane Emissions (g/s)
1	491.20	3185.40	5.17E+05	0.5
2	491.25	3185.42	3.01E+06	3.0
3	492.08	3185.43	5.15E+06	5.2
4	492.10	3185.52	5.18E+04	0.1
5	491.16	3185.28	2.67E+05	0.3
6	492.06	3185.47	2.99E+06	3.0
7	492.09	3185.48	4.80E+05	0.5
8	492.12	3185.60	6.34E+05	0.6
9	491.18	3185.21	3.72E+05	0.4
10	491.27	3185.29	4.62E+04	0.0
11	491.25	3185.30	2.76E+05	0.3
12	491.68	3185.51	2.72E+06	2.7
13	491.68	3185.57	6.52E+06	6.5
14	491.66	3185.61	8.45E+05	0.8
15	491.58	3185.33	2.81E+06	2.8
16	491.70	3184.98	2.38E+04	0.0
17	492.04	3185.44	8.21E+06	8.2
18	492.05	3185.43	2.52E+07	25.2
19	492.04	3185.41	1.16E+07	11.6
20	492.02	3185.48	1.07E+07	10.7
21	492.10	3185.54	9.66E+05	1.0
22	492.08	3185.62	3.17E+06	3.2
23	492.05	3185.62	2.64E+06	2.6
24	492.02	3185.62	1.09E+06	1.1
25	491.99	3185.62	9.01E+06	9.0
26	491.98	3185.49	4.57E+06	4.6
27	491.56	3185.28	1.87E+07	18.7
28	491.18	3185.26	1.64E+05	0.2
29	491.18	3185.24	1.85E+05	0.2
30	491.19	3185.15	9.39E+04	0.1
31	491.58	3185.57	4.42E+06	4.4
32	491.57	3185.61	5.81E+05	0.6
33	491.60	3185.61	4.69E+05	0.5
34	491.65	3185.57	5.75E+06	5.7
35	491.62	3185.57	8.45E+06	8.5
36	491.63	3185.61	1.15E+06	1.1
37	491.72	3185.57	1.92E+06	1.9
38	491.69	3185.61	2.77E+06	2.8
39	491.72	3185.61	5.36E+06	5.4
40	491.48	3185.57	1.43E+06	1.4
41	491.61	3185.33	6.24E+06	6.2

42	491.71	3185.32	1.46E+07	14.6
43	491.51	3185.57	1.34E+06	1.3
44	491.71	3184.94	4.91E+05	0.5
45	491.72	3184.92	5.65E+05	0.6
46	492.02	3185.53	1.34E+05	0.1
47	492.00	3185.48	8.22E+05	0.8
48	492.12	3185.62	9.26E+05	0.9
49	491.93	3185.57	7.89E+06	7.9
50	491.84	3185.62	4.69E+06	4.7
51	491.81	3185.62	2.12E+06	2.1
52	491.79	3185.57	8.09E+06	8.1
53	491.82	3185.50	1.05E+06	1.1
54	491.19	3185.17	4.14E+05	0.4
55	491.74	3185.37	9.44E+05	0.9
56	491.85	3185.31	9.81E+06	9.8
57	491.59	3185.28	1.53E+07	15.3
58	491.58	3185.03	2.95E+06	2.9
59	491.75	3185.32	6.81E+06	6.8
60	491.55	3185.57	1.96E+06	2.0
61	491.51	3185.61	3.84E+05	0.4
62	491.54	3185.61	4.23E+05	0.4
63	491.52	3185.44	2.63E+06	2.6
64	491.61	3185.38	1.02E+06	1.0
65	491.59	3185.02	2.90E+06	2.9
66	491.65	3184.94	3.50E+05	0.4
67	491.82	3185.57	1.28E+06	1.3
68	491.88	3185.46	4.95E+05	0.5
69	491.96	3185.62	2.94E+06	2.9
70	491.96	3185.58	7.95E+06	8.0
71	491.93	3185.62	7.54E+06	7.5
72	491.90	3185.62	8.94E+06	8.9
73	491.87	3185.62	1.34E+07	13.4
74	491.75	3185.61	1.56E+07	15.6
75	491.78	3185.61	6.87E+05	0.7
76	491.94	3185.39	1.14E+08	114.0
77	491.78	3185.31	1.19E+04	0.0
78	491.54	3185.28	8.05E+06	8.1
79	491.51	3185.29	3.40E+06	3.4
80	491.76	3185.43	9.20E+05	0.9
81	491.80	3185.37	9.45E+06	9.5
82	491.65	3185.33	1.22E+07	12.2
83	491.66	3185.38	9.89E+04	0.1
84	491.71	3185.37	3.59E+06	3.6
85	491.68	3185.32	2.14E+07	21.4
86	491.61	3185.28	1.88E+07	18.8
87	491.71	3185.27	8.25E+06	8.3
88	491.59	3185.38	2.23E+06	2.2
89	491.62	3185.44	9.46E+04	0.1

90	491.62	3185.51	4.60E+05	0.5
91	491.58	3185.44	1.68E+07	16.8
92	491.89	3185.57	5.23E+05	0.5
93	491.86	3185.57	6.42E+06	6.4
94	491.89	3185.51	3.87E+06	3.9
95	491.81	3185.31	2.39E+07	23.9
96	491.87	3185.40	2.38E+05	0.2
97	491.48	3184.87	1.45E+07	14.5
98	491.50	3185.05	1.72E+05	0.2
99	491.56	3185.38	1.45E+06	1.5
100	491.55	3185.33	3.84E+07	38.4
101	491.97	3185.49	1.12E+07	11.2
102	491.95	3185.50	9.50E+06	9.5
103	491.47	3185.03	1.66E+06	1.7
104	491.49	3184.93	4.25E+06	4.3
105	491.48	3184.93	4.67E+07	46.7
106	491.54	3185.39	1.67E+06	1.7
107	491.52	3185.34	1.03E+07	10.3
108	491.51	3185.38	3.89E+06	3.9

MATLAB Predicted Methane Emissions 2nd Quarter 2008:

Sources Processed by MATLAB (170)	X-Coordinate (UTM km)	Y-Coordinate (UTM km)	Predicted Methane Emissions (ug/s)	Predicted Methane Emissions (g/s)
1	491.14	3185.10	4.10E+05	0.4
2	491.76	3184.78	1.67E+06	1.7
3	491.54	3184.70	3.11E+06	3.1
4	491.36	3185.28	2.90E+05	0.3
5	491.95	3185.22	3.35E+06	3.4
6	491.89	3185.27	1.21E+07	12.1
7	491.55	3184.77	1.36E+06	1.4
8	491.31	3184.90	3.94E+06	3.9
9	491.37	3184.90	6.98E+04	0.1
10	491.44	3184.78	2.48E+06	2.5
11	491.41	3184.86	5.41E+04	0.1
12	491.35	3184.95	4.72E+06	4.7
13	491.40	3184.92	1.40E+06	1.4
14	491.36	3185.03	1.05E+05	0.1
15	491.61	3185.05	1.23E+05	0.1
16	491.64	3185.01	2.15E+05	0.2
17	491.63	3185.01	2.15E+05	0.2
18	491.45	3184.90	1.19E+06	1.2
19	491.25	3185.26	8.22E+05	0.8
20	491.75	3185.21	1.35E+07	13.5
21	491.46	3185.44	2.09E+06	2.1
22	491.17	3185.11	1.58E+05	0.2
23	491.16	3185.17	2.57E+05	0.3
24	491.37	3185.16	3.31E+05	0.3
25	491.33	3184.94	1.41E+05	0.1
26	491.32	3184.99	9.85E+05	1.0
27	491.28	3184.87	1.05E+06	1.0
28	491.33	3184.85	7.86E+05	0.8
29	491.35	3184.86	9.06E+04	0.1
30	491.38	3184.79	1.48E+06	1.5
31	491.39	3184.97	9.65E+05	1.0
32	491.56	3184.84	1.04E+06	1.0
33	491.76	3184.83	2.48E+06	2.5
34	491.70	3184.92	1.43E+06	1.4
35	491.66	3184.96	9.89E+05	1.0
36	491.71	3184.93	4.45E+04	0.0
37	491.73	3184.88	6.12E+03	0.0
38	491.90	3185.51	7.13E+06	7.1
39	491.89	3185.50	2.17E+05	0.2
40	491.80	3185.59	1.06E+07	10.6
41	491.77	3185.59	3.72E+06	3.7

42	491.72	3185.62	5.53E+05	0.6
43	491.72	3185.59	1.30E+06	1.3
44	491.75	3185.55	5.57E+05	0.6
45	491.33	3185.26	5.68E+05	0.6
46	491.43	3185.20	8.70E+06	8.7
47	491.51	3185.26	4.63E+07	46.3
48	491.53	3185.24	8.55E+06	8.5
49	491.48	3185.26	2.45E+07	24.5
50	491.27	3185.29	1.11E+05	0.1
51	491.79	3185.27	1.75E+07	17.5
52	491.75	3185.24	1.99E+07	19.9
53	491.76	3185.28	7.05E+06	7.0
54	491.64	3185.27	1.23E+07	12.3
55	491.61	3185.27	5.91E+05	0.6
56	491.70	3185.26	5.26E+07	52.6
57	491.67	3185.26	4.00E+06	4.0
58	491.54	3185.46	1.10E+06	1.1
59	491.63	3185.55	9.91E+05	1.0
60	491.51	3185.46	6.92E+05	0.7
61	492.01	3185.39	4.51E+07	45.1
62	491.98	3185.34	6.03E+07	60.3
63	491.97	3185.40	1.65E+07	16.5
64	491.20	3185.14	4.96E+05	0.5
65	491.15	3185.22	2.35E+05	0.2
66	491.13	3185.15	6.65E+05	0.7
67	491.11	3185.31	3.99E+04	0.0
68	491.15	3185.27	1.76E+05	0.2
69	491.23	3185.31	5.81E+05	0.6
70	491.17	3185.31	1.02E+05	0.1
71	491.22	3185.24	1.40E+06	1.4
72	491.46	3185.16	2.71E+05	0.3
73	491.25	3185.20	1.48E+06	1.5
74	491.27	3185.15	3.11E+06	3.1
75	491.33	3185.12	9.85E+05	1.0
76	491.21	3184.82	3.56E+06	3.6
77	491.44	3184.94	7.31E+05	0.7
78	491.51	3184.98	4.78E+06	4.8
79	491.47	3184.85	4.53E+06	4.5
80	491.51	3184.84	5.94E+05	0.6
81	491.52	3184.85	2.93E+06	2.9
82	491.51	3184.90	6.55E+06	6.6
83	491.62	3184.92	3.30E+07	33.0
84	491.58	3184.89	3.24E+05	0.3
85	491.75	3185.49	6.89E+05	0.7
86	491.86	3185.55	2.20E+05	0.2
87	491.86	3185.59	3.72E+06	3.7
88	491.60	3185.30	6.88E+06	6.9
89	491.62	3185.29	1.71E+07	17.1
90	491.79	3185.40	2.14E+07	21.4

91	491.82	3185.33	3.21E+06	3.2
92	491.64	3185.28	1.96E+07	19.6
93	491.62	3185.43	1.31E+07	13.1
94	491.54	3185.29	6.43E+06	6.4
95	491.52	3185.34	1.33E+07	13.3
96	491.49	3185.34	1.24E+06	1.2
97	491.57	3185.52	2.71E+07	27.1
98	491.46	3185.46	1.49E+07	14.9
99	491.49	3185.46	2.77E+06	2.8
100	492.10	3185.41	3.63E+06	3.6
101	491.98	3185.41	3.89E+07	38.9
102	491.87	3185.31	5.72E+06	5.7
103	491.86	3185.25	5.09E+07	50.9
104	491.85	3185.26	1.23E+07	12.3
105	491.88	3185.26	5.12E+06	5.1
106	491.81	3185.26	8.89E+06	8.9
107	491.82	3185.27	2.01E+07	20.1
108	491.23	3185.13	4.86E+05	0.5
109	491.33	3185.08	4.71E+04	0.0
110	491.32	3185.05	4.30E+04	0.0
111	491.29	3185.04	3.29E+06	3.3
112	491.11	3185.26	3.05E+05	0.3
113	491.29	3185.15	1.02E+05	0.1
114	491.14	3185.04	3.70E+05	0.4
115	491.43	3185.04	5.55E+05	0.6
116	491.40	3185.03	2.36E+06	2.4
117	491.60	3184.72	1.01E+06	1.0
118	491.65	3184.70	1.64E+06	1.6
119	491.66	3184.76	4.00E+06	4.0
120	491.83	3185.55	5.44E+06	5.4
121	491.49	3185.32	1.11E+07	11.1
122	491.51	3185.30	1.96E+06	2.0
123	491.74	3185.28	1.28E+07	12.8
124	491.73	3185.31	1.16E+07	11.6
125	491.62	3185.31	1.45E+07	14.5
126	491.56	3185.29	5.59E+05	0.6
127	491.59	3185.28	2.18E+07	21.8
128	491.96	3185.45	1.65E+07	16.5
129	492.07	3185.45	5.48E+06	5.5
130	492.11	3185.57	3.13E+05	0.3
131	492.07	3185.61	3.18E+05	0.3
132	491.88	3185.33	5.73E+07	57.3
133	491.88	3185.35	1.76E+07	17.6
134	491.81	3185.31	1.26E+07	12.6
135	491.23	3184.90	1.06E+06	1.1
136	491.25	3184.92	2.27E+06	2.3
137	491.25	3184.98	1.08E+06	1.1
138	491.21	3185.08	1.16E+05	0.1
139	491.18	3185.06	2.44E+04	0.0

140	491.23	3185.03	6.56E+05	0.7
141	491.73	3184.82	6.06E+05	0.6
142	491.70	3184.79	5.75E+06	5.7
143	491.64	3184.86	1.30E+06	1.3
144	491.73	3185.43	3.21E+07	32.1
145	491.70	3185.43	1.16E+07	11.6
146	491.68	3185.43	1.16E+07	11.6
147	491.70	3185.31	1.92E+07	19.2
148	491.67	3185.31	5.97E+06	6.0
149	491.54	3185.34	6.30E+05	0.6
150	491.57	3185.34	1.55E+07	15.5
151	491.52	3185.52	1.28E+07	12.8
152	492.08	3185.47	2.35E+06	2.3
153	491.91	3185.32	2.43E+07	24.3
154	491.90	3185.29	7.81E+06	7.8
155	491.92	3185.35	3.67E+06	3.7
156	491.20	3184.90	1.74E+06	1.7
157	491.16	3184.99	2.99E+05	0.3
158	491.46	3185.52	5.98E+06	6.0
159	491.50	3185.56	1.01E+07	10.1
160	492.09	3185.50	1.01E+06	1.0
161	492.01	3185.44	8.14E+06	8.1
162	491.99	3185.45	1.70E+07	17.0
163	492.01	3185.55	3.64E+05	0.4
164	492.02	3185.58	9.36E+06	9.4
165	491.99	3185.59	3.14E+06	3.1
166	491.49	3185.52	1.12E+05	0.1
167	492.10	3185.53	3.01E+05	0.3
168	492.10	3185.55	2.52E+05	0.3
169	492.04	3185.44	2.27E+07	22.7
170	491.96	3185.56	8.32E+06	8.3

APPENDIX D: AVERAGE LANDFILL BIOGAS COMPOSITION

Case 1:

Average Landfill Biogas Composition	
Component	**Content**
Methane, CH_4	54%
Carbon dioxide, CO_2	42%
Nitrogen, N_2	3.10%
Oxygen, O_2	0.80%
Chlorine	22 mg/m^3
Fluorine	5 mg/m^3
Hydrogen sulfide, H_2S	88 mg/m^3

Bluvshtein, Ilia. "Non-traditional Sources of Gas and Their Quality." PowerPoint. June 4, 2008.Uniongas: A Spectra Energy Company. http://www.cga.ca/events/documents/Non-traditionalsourcesofgasandtheirquality-IliaBluvshtein.pdf

Case 2:

Typical analysis of raw landfill gas		
Component	**Chemical formula**	**Content**
Methane	CH_4	40-60 (% by vol.)
Carbon dioxide	CO_2	20-40 (% by vol.)
Nitrogen	N_2	2-20 (% by vol.)
Oxygen	O_2	<1 (% by vol.)
Heavier hydrocarbons	C_nH_{2n+2}	<1 (% by vol.)
Hydrogen sulfide	H_2S	40-100 ppm
Complex organics	−	1000-2000 ppm

Treloar, J. (1998). *Recovery and Use of Landfill Gas in Adelaide, South Australia*. Flinders University. Adelaide, Australia.

Case 3:

Biogas Properties	
Component	**Content**
Methane, CH_4	73 (% by vol.)
Carbon dioxide, CO_2	27 (% by vol.)
Hydrogen Sulfide, H_2S	<0.1 (% by vol.)

Cluff, Randy. "Creating Renewable Energy Using Your Organic Wastes." PowerPoint. June 2006. Canada Composting INC. http://www.seainnovation.com/UploadedFiles/presentation%20for%20north%20trip.pdf

Case 4:

Component	%Volume
Methane	53.283
Carbon Dioxide	45.588
Hydrogen	0.056
Oxygen	0.070
Nitrogen	0.272
Hydrogen Sulfide	0.002
Trace Gases	
Heptane	0.290
Octane	0.206
Nonane	0.064
Hexane	0.128
n-Pentane	0.014
iso-Pentane	0.010
Propane	0.007
n-Butane	0.006
iso-Butane	0.004

Brosseau, J., & Michele H. (1994) Trace gas compound emissions from Municipal Landfill Sanitary Sites. *Atmospheric Environment, 2, 285-293.*

Case 5:

CH_4 (ppm)	H_2S (ppm)	1-butene (ppb)
231	5.13	3.08
170	3.78	2.27
150	3.33	2.00
100	2.22	1.33
30	1.33	0.80
40	0.89	0.53
20	0.42	0.27
10	0.22	0.13
7.5	0.17	0.10
4.5	0.10	0.06

Tagaris, E. & Sotiropoulou, R.E.P. & Pilinis, C. & Halvadakis, C.P. "A Methodology to Estimate Odors around Landfill Sites: The Use of Methane as an Odor Index and Its Utility in Landfill Siting." *Journal of the Air and Waste Management Association,* 53: 629-634, 2003.

Case 6:

At three landfill sites in South Korea, samples of LFG vents yielded following concentrations of H_2S in ppb

Site W-247,758 ppb (average of 6 samples, with readings ranging from 212 to 681,370 ppb, with 3 samples above 225,000). Methane readings averaged: 28.6%

Site B- 115,275 ppb (average of 8 samples, with readings ranging from 89,132 to 143,091 ppb, with only 1 sample below 102,000). Methane reading averaged 58.5%

Site H- 2,344,360 ppb (average of 3 samples: 854,580 ppb, 5,142900 ppb, and 1,035,600 ppb). Methane readings averaged 31.6%.

Kim, Ki-Hyun, Choi, Y.J., Jeon, E.C., and Sunwoo, Young. (2005) Characterization of malodorous sulfur compounds in landfill gas. *Atmospheric Environment, 39, 1103-1112*.

APPENDIX E: 4^{TH} RANK AERMOD OUTPUTS

(Shown below are the outputs from the air dispersion model AERMOD each of the concentrations at a given receptor are concentrations of methane that can be used as a surrogate for odors. Each of the receptors is either part of one of the polar rings that surround the landfill or is part of the fence line receptors.)

4th Quarter 2006

Receptor #	X (meters)	Y (meters)	Concentration (ug/m^s)	Concentration (ppm)	Year, Day, Time
1	491740.1563	3185903.25	53456.06641	81.69	1071905
2	491757.5313	3186001.75	50594.26562	77.31	1041507
3	491774.9063	3186100.25	45158.64453	69.01	1061403
4	491792.25	3186198.75	42056.33203	64.27	1070703
5	491809.625	3186297.25	38833.32422	59.34	1071808
6	491827	3186395.75	35713.46094	54.57	1070703
7	491844.3438	3186494.25	33304.35547	50.89	1061403
8	491874.875	3185867.25	56728.26172	86.69	1061510
9	491909.0625	3185961.25	48668.89062	74.37	1060106
10	491943.2813	3186055.25	44868.1875	68.56	1082501
11	491977.4688	3186149.25	42277.82812	64.61	1061603
12	492011.6875	3186243.25	39301.70312	60.06	1061603
13	492045.875	3186337	36230.41797	55.36	1082501
14	492080.0938	3186431	33472.97266	51.15	1062103
15	492001.25	3185808.25	69962.90625	106.91	1012407
16	492051.25	3185895	61104.72266	93.38	1061606
17	492101.25	3185981.5	51789.01172	79.14	1081810
18	492151.25	3186068.25	46897.10156	71.66	1062402
19	492201.25	3186154.75	41859.39844	63.97	1071809
20	492251.25	3186241.25	37348.55469	57.07	1052901
21	492301.25	3186328	36603.91406	55.94	1052901
22	492115.4688	3185728.25	63461.23047	96.98	1020603
23	492179.75	3185805	56228.75781	85.92	1081804
24	492244.0313	3185881.5	52537.35547	80.28	1100624
25	492308.3125	3185958.25	49003.18359	74.88	1092108
26	492372.5938	3186034.75	44921.98047	68.65	1060901
27	492436.875	3186111.25	42044.21875	64.25	1060901
28	492501.1563	3186188	39896.42188	60.97	1030224
29	492214.0938	3185629.75	66654.125	101.86	1053001
30	492290.6875	3185694	60936.79688	93.12	1041405
31	492367.2813	3185758.25	54945.36719	83.96	1092106
32	492443.9063	3185822.5	49792.63672	76.09	1092106
33	492520.5	3185886.75	45447.80078	69.45	1081408
34	492597.0938	3185951	41950.87891	64.11	1081804
35	492673.7188	3186015.5	40102.77734	61.28	1081804
36	492294.0625	3185515.5	86482.92188	132.16	1112001
37	492380.6875	3185565.5	71289.40625	108.94	1041505
38	492467.2813	3185615.5	54733.34375	83.64	1060806
39	492553.875	3185665.5	50578.21875	77.29	1092010

40	492640.4688	3185715.5	47892.84766	73.19	1060303
41	492727.0938	3185765.5	42472.3125	64.90	1121824
42	492813.6875	3185815.5	41242.69531	63.02	1012411
43	492353	3185389	55714.23047	85.14	1061402
44	492446.9688	3185423.25	53317.07031	81.48	1080911
45	492540.9375	3185457.5	57299.04688	87.56	1082606
46	492634.9063	3185491.75	47889.50781	73.18	1081910
47	492728.875	3185526	49359.48047	75.43	1030812
48	492822.8438	3185560.25	39159.63672	59.84	1052005
49	492916.8125	3185594.25	34206.22656	52.27	1081910
50	492389.0938	3185254.5	55353.77734	84.59	1060905
51	492487.5625	3185271.75	52618.16406	80.41	1041403
52	492586.0625	3185289.25	44362.12891	67.79	1053102
53	492684.5313	3185306.5	39946.37109	61.04	1051805
54	492783.0313	3185324	35968.44531	54.96	1051805
55	492881.5	3185341.25	33136.25781	50.64	1051805
56	492979.9688	3185358.5	29838.73047	45.60	1051805
57	492401.25	3185115.5	48711.85938	74.44	1012702
58	492501.25	3185115.5	44111.64844	67.41	1051801
59	492601.25	3185115.5	39341.71094	60.12	1013108
60	492701.25	3185115.5	38959.81641	59.54	1012703
61	492801.25	3185115.5	36306.57422	55.48	1061402
62	492901.25	3185115.5	37222.97266	56.88	1013108
63	493001.25	3185115.5	36225.83594	55.36	1060905
64	492389.0938	3184976.5	42080.42188	64.30	1012712
65	492487.5625	3184959.25	40241.71094	61.49	1120907
66	492586.0625	3184941.75	38700.51562	59.14	1012408
67	492684.5313	3184924.5	38032.38281	58.12	1053101
68	492783.0313	3184907	35774.39844	54.67	1051904
69	492881.5	3184889.75	35000.96875	53.49	1051904
70	492979.9688	3184872.5	32590.95312	49.80	1053101
71	492353	3184842	35307.32031	53.95	1120102
72	492446.9688	3184807.75	32396.10352	49.51	1082408
73	492540.9375	3184773.5	32979.6875	50.40	1082408
74	492634.9063	3184739.25	31398.54297	47.98	1102301
75	492728.875	3184705	29452.38867	45.01	1012712
76	492822.8438	3184670.75	25317.30859	38.69	1082407
77	492916.8125	3184636.75	25880.80664	39.55	1082407
78	492294.0625	3184715.5	38829.14844	59.34	1031006
79	492380.6875	3184665.5	37956.03906	58.00	1082410
80	492467.2813	3184615.5	36531.62109	55.82	1082410
81	492553.875	3184565.5	34688.80078	53.01	1031006
82	492640.4688	3184515.5	32034.43945	48.95	1082410
83	492727.0938	3184465.5	29270.1875	44.73	1082410
84	492813.6875	3184415.5	26597.39648	40.64	1082410
85	492214.0938	3184601.25	36590.69922	55.92	1070811
86	492290.6875	3184537	36326.35156	55.51	1012403
87	492367.2813	3184472.75	35527.42578	54.29	1070704

88	492443.9063	3184408.5	34046.26562	52.03	1030803
89	492520.5	3184344.25	31748.06641	48.52	1030804
90	492597.0938	3184280	29714.72852	45.41	1030803
91	492673.7188	3184215.5	27568.00586	42.13	1030803
92	492115.4688	3184502.75	38376.92578	58.64	1081102
93	492179.75	3184426	34299.625	52.41	1081102
94	492244.0313	3184349.5	30669.21484	46.87	1081102
95	492308.3125	3184272.75	29233.42578	44.67	1123006
96	492372.5938	3184196.25	26711.5293	40.82	1123006
97	492436.875	3184119.75	24697.67773	37.74	1022524
98	492501.1563	3184043	23371.67578	35.71	1032624
99	492001.25	3184422.75	38229.98828	58.42	1061409
100	492051.25	3184336	34641.60156	52.94	1061409
101	492101.25	3184249.5	31438.51562	48.04	1061409
102	492151.25	3184162.75	28616.73633	43.73	1061409
103	492201.25	3184076.25	26124.83203	39.92	1061409
104	492251.25	3183989.75	23947.23828	36.59	1061409
105	492301.25	3183903	22061.35547	33.71	1061409
106	491874.875	3184363.75	42633.21094	65.15	1040203
107	491909.0625	3184269.75	39568.23438	60.47	1040203
108	491943.2813	3184175.75	36878.78906	56.36	1040203
109	491977.4688	3184081.75	34548.03906	52.79	1062004
110	492011.6875	3183987.75	32491.6582	49.65	1110707
111	492045.875	3183894	30583.76562	46.74	1110707
112	492080.0938	3183800	28853.07031	44.09	1110707
113	491740.1563	3184327.75	35539.35938	54.31	1122208
114	491757.5313	3184229.25	33743.13281	51.56	1122208
115	491774.9063	3184130.75	28267.26758	43.20	1010104
116	491792.25	3184032.25	25586.08008	39.10	1092705
117	491809.625	3183933.75	24402.80469	37.29	1092705
118	491827	3183835.25	23314.89844	35.63	1092705
119	491844.3438	3183736.75	22313.08203	34.10	1092705
120	491601.25	3184315.5	42991.22266	65.70	1082602
121	491601.25	3184215.5	39745.50781	60.74	1011104
122	491601.25	3184115.5	37447.01953	57.22	1062011
123	491601.25	3184015.5	34598.02344	52.87	1123011
124	491601.25	3183915.5	32662.64258	49.91	1120704
125	491601.25	3183815.5	30873.18164	47.18	1120704
126	491601.25	3183715.5	29132.49414	44.52	1120704
127	491462.3438	3184327.75	38654.3125	59.07	1122201
128	491444.9688	3184229.25	35747.80469	54.63	1010103
129	491427.5938	3184130.75	32560.79102	49.76	1042805
130	491410.25	3184032.25	31637.38672	48.35	1042805
131	491392.875	3183933.75	28506.75195	43.56	1070804
132	491375.5	3183835.25	27737.29297	42.39	1070804
133	491358.1563	3183736.75	26373.10742	40.30	1062706
134	491327.625	3184363.75	39861.83203	60.91	1091703
135	491293.4375	3184269.75	37787.61328	57.74	1121907

136	491259.2188	3184175.75	34934.46875	53.38	1121907
137	491225.0313	3184081.75	32195.35938	49.20	1100403
138	491190.8125	3183987.75	29567.4082	45.18	1121305
139	491156.625	3183894	27507.95703	42.04	1080810
140	491122.4063	3183800	26471.64648	40.45	1082304
141	491201.25	3184422.75	38261.67969	58.47	1122707
142	491151.25	3184336	35288.16406	53.92	1021205
143	491101.25	3184249.5	33066.24219	50.53	1111206
144	491051.25	3184162.75	32170.61328	49.16	1091706
145	491001.25	3184076.25	31501.38477	48.14	1091706
146	490951.25	3183989.75	30057.21484	45.93	1091701
147	490901.25	3183903	28383.73438	43.37	1082305
148	491087.0313	3184502.75	43784.58203	66.91	1062704
149	491022.75	3184426	41633.66406	63.62	1020703
150	490958.4688	3184349.5	39189.13672	59.89	1121908
151	490894.1875	3184272.75	36072.12891	55.12	1091704
152	490829.9063	3184196.25	34227.37109	52.30	1022701
153	490765.625	3184119.75	30870.125	47.17	1022701
154	490701.3438	3184043	27552.80078	42.10	1022701
155	490988.4063	3184601.25	40958.14062	62.59	1031011
156	490911.8125	3184537	34029.48047	52.00	1062611
157	490835.2188	3184472.75	28460.4082	43.49	1062611
158	490758.5938	3184408.5	25829.49414	39.47	1011610
159	490682	3184344.25	22916.9668	35.02	1091704
160	490605.4063	3184280	20078.12891	30.68	1061804
161	490528.7813	3184215.5	18043.46484	27.57	1072605
162	490908.4375	3184715.5	44077.31641	67.36	1082907
163	490821.8125	3184665.5	39883.1875	60.95	1120913
164	490735.2188	3184615.5	39499.78125	60.36	1120913
165	490648.625	3184565.5	39146.67578	59.82	1120913
166	490562.0313	3184515.5	35763.19922	54.65	1050201
167	490475.4063	3184465.5	33800.43359	51.65	1121207
168	490388.8125	3184415.5	33075.69531	50.54	1050201
169	490849.5	3184842	45569.75781	69.64	1120913
170	490755.5313	3184807.75	37392.22656	57.14	1120913
171	490661.5625	3184773.5	34471.5	52.68	1050201
172	490567.5938	3184739.25	31978.08203	48.87	1121207
173	490473.625	3184705	29672.53711	45.34	1080709
174	490379.6563	3184670.75	29347.05859	44.85	1052404
175	490285.6875	3184636.75	29395.07031	44.92	1052404
176	490813.4063	3184976.5	56143.35938	85.79	1020907
177	490714.9375	3184959.25	54046.49219	82.59	1091805
178	490616.4375	3184941.75	50947.98438	77.85	1112407
179	490517.9688	3184924.5	47261.91406	72.22	1110809
180	490419.4688	3184907	44250.03906	67.62	1100401
181	490321	3184889.75	41933.0625	64.08	1061502
182	490222.5313	3184872.5	40272.64844	61.54	1110802
183	490801.25	3185115.5	60346.60156	92.22	1061502

184	490701.25	3185115.5	55641.62109	85.03	1120207
185	490601.25	3185115.5	54461.73828	83.22	1112807
186	490501.25	3185115.5	53267.45703	81.40	1112807
187	490401.25	3185115.5	48596.62891	74.26	1121707
188	490301.25	3185115.5	43326.22656	66.21	1051106
189	490201.25	3185115.5	41601.51172	63.57	1011801
190	490813.4063	3185254.5	72782.88281	111.22	1042306
191	490714.9375	3185271.75	61466.42188	93.93	1011609
192	490616.4375	3185289.25	54369.13281	83.08	1110723
193	490517.9688	3185306.5	50958.59375	77.87	1112406
194	490419.4688	3185324	47290.60547	72.27	1121309
195	490321	3185341.25	42441.45703	64.86	1040707
196	490222.5313	3185358.5	39258.92969	59.99	1112406
197	490849.5	3185389	74084.17188	113.21	1090601
198	490755.5313	3185423.25	58594.61719	89.54	1112902
199	490661.5625	3185457.5	54132.22266	82.72	1081205
200	490567.5938	3185491.75	50950.32422	77.86	1121224
201	490473.625	3185526	44631.78906	68.20	1020908
202	490379.6563	3185560.25	41107.70312	62.82	1022001
203	490285.6875	3185594.25	37696.09766	57.60	1112405
204	490908.4375	3185515.5	62259.26562	95.14	1061806
205	490821.8125	3185565.5	55803.1875	85.27	1040224
206	490735.2188	3185615.5	47706.73047	72.90	1080401
207	490648.625	3185665.5	44393.35547	67.84	1020908
208	490562.0313	3185715.5	40987.38281	62.63	1122306
209	490475.4063	3185765.5	37049.96875	56.62	1072806
210	490388.8125	3185815.5	35237.60938	53.85	1112923
211	490988.4063	3185629.75	69163.26562	105.69	1012901
212	490911.8125	3185694	60615.55469	92.63	1040224
213	490835.2188	3185758.25	54928.14844	83.94	1092401
214	490758.5938	3185822.5	50430.42969	77.06	1020802
215	490682	3185886.75	48788.58203	74.56	1121005
216	490605.4063	3185951	43941.74219	67.15	1121005
217	490528.7813	3186015.5	38617.48828	59.01	1120803
218	491087.0313	3185728.25	88323.55469	134.97	1112308
219	491022.75	3185805	76051.28906	116.22	1112503
220	490958.4688	3185881.5	64361.66016	98.35	1083102
221	490894.1875	3185958.25	58784.1875	89.83	1081307
222	490829.9063	3186034.75	49346.70312	75.41	1121202
223	490765.625	3186111.25	43812.25	66.95	1020610
224	490701.3438	3186188	40029.89844	61.17	1022102
225	491201.25	3185808.25	106174.0625	162.25	1083002
226	491151.25	3185895	83608.35156	127.76	1072705
227	491101.25	3185981.5	63520.39844	97.07	1121023
228	491051.25	3186068.25	56660.34375	86.58	1122308
229	491001.25	3186154.75	50783.67969	77.60	1082824
230	490951.25	3186241.25	46079.15625	70.41	1082824
231	490901.25	3186328	41930.1875	64.07	1082824

232	491327.625	3185867.25	114492.8203	174.96	1020108
233	491293.4375	3185961.25	88390.875	135.07	1112306
234	491259.2188	3186055.25	76306.32031	116.61	1112306
235	491225.0313	3186149.25	65642.03125	100.31	1122801
236	491190.8125	3186243.25	57756.95312	88.26	1040701
237	491156.625	3186337	50569.63281	77.28	1121106
238	491122.4063	3186431	46616.52734	71.24	1121106
239	491462.3438	3185903.25	85467.83594	130.61	1060103
240	491444.9688	3186001.75	67732.32812	103.50	1061811
241	491427.5938	3186100.25	60943.35156	93.13	1061811
242	491410.25	3186198.75	56703.14453	86.65	1031503
243	491392.875	3186297.25	51107.51172	78.10	1031503
244	491375.5	3186395.75	43573.86328	66.59	1121113
245	491358.1563	3186494.25	41387.62891	63.25	1060302
246	491601.25	3185915.5	64308.25	98.27	1061603
247	491601.25	3186015.5	53105.94531	81.15	1072101
248	491601.25	3186115.5	49317.67969	75.36	1071808
249	491601.25	3186215.5	43087.92969	65.84	1060804
250	491601.25	3186315.5	39655.82031	60.60	1092006
251	491601.25	3186415.5	37465.59375	57.25	1060804
252	491601.25	3186515.5	35771.85938	54.66	1060103
253	491545.5	3185868	73694.32031	112.61	1033106
254	491545.5	3185768	104582.5547	159.82	1061510
255	491545.5	3185668	157668.0781	240.94	1080802
256	491645.5	3185668	109742.3828	167.70	1060301
257	491745.5	3185668	121759.5156	186.06	1120806
258	491845.5	3185668	153907.2656	235.19	1061606
259	491945.5	3185668	84160.52344	128.61	1092108
260	492045.5	3185668	71405.875	109.12	1020603
261	492145.5	3185668	68048.71875	103.99	1092106
262	492145.5	3185568	83503.27344	127.60	1053001
263	492145.5	3185468	131760.5313	201.35	1060806
264	492145.5	3185368	75789.1875	115.82	1032302
265	492145.5	3185268	75752.54688	115.76	1012701
266	492145.5	3185168	64586.17969	98.70	1010424
267	492145.5	3185068	51196.62891	78.23	1012712
268	492145.5	3184968	49750.39062	76.02	1082410
269	492145.5	3184868	47484.98438	72.56	1082410
270	492145.5	3184768	46016.13672	70.32	1030803
271	492145.5	3184668	40322.375	61.62	1030803
272	492145.5	3184568	35548.51172	54.32	1022524
273	492045.5	3184568	41003.40234	62.66	1123006
274	491945.5	3184568	40252.02344	61.51	1061409
275	491845.5	3184568	47867.98828	73.15	1040203
276	491745.5	3184568	51487.90234	78.68	1112607
277	491645.5	3184568	53935.54688	82.42	1082602
278	491545.5	3184568	51704.09766	79.01	1011104
279	491445.5	3184568	48436.98047	74.02	1010103

280	491345.5	3184568	47462.11719	72.53	1121907
281	491245.5	3184568	42392.42188	64.78	1122707
282	491145.5	3184568	47555.43359	72.67	1011105
283	491045.5	3184568	49745.21484	76.02	1022701
284	491045.5	3184668	49855.79297	76.19	1062704
285	491045.5	3184768	49527.61719	75.68	1082907
286	491045.5	3184868	58985.63281	90.14	1031011
287	491045.5	3184968	65694.04688	100.39	1082907
288	491045.5	3185068	73051.10938	111.63	1112609
289	491045.5	3185168	79403.19531	121.34	1120724
290	491045.5	3185268	113926.3828	174.09	1020807
291	491045.5	3185368	102752.9844	157.02	1062003
292	491045.5	3185468	88829.07812	135.74	1122306
293	491145.5	3185468	106566.6484	162.85	1040224
294	491145.5	3185568	100620.1875	153.76	1040707
295	491245.5	3185568	142379.3125	217.57	1020908
296	491245.5	3185668	135537.1563	207.12	1112509
297	491245.5	3185768	122549.7109	187.27	1072705
298	491345.5	3185768	155739.625	237.99	1112306
299	491345.5	3185868	117467.9531	179.51	1112404
300	491445.5	3185868	97213.79688	148.55	1070702

2nd Quarter 2007

Receptor #	X (meters)	Y (meters)	Concentration (ug/m^s)	Concentration (ppm)	Year, Day, Time
1	491740.1563	3185903.25	80076.23	122.37	1112301
2	491757.5313	3186001.75	80017.16	122.28	1112306
3	491774.9063	3186100.25	70997.74	108.49	1020108
4	491792.25	3186198.75	62176.93	95.01	1021609
5	491809.625	3186297.25	54559.88	83.37	1090206
6	491827	3186395.75	48856.76	74.66	1121104
7	491844.3438	3186494.25	42583.29	65.07	1022607
8	491874.875	3185867.25	110522.77	168.89	1021602
9	491909.0625	3185961.25	91274.43	139.48	1031503
10	491943.2813	3186055.25	74027.99	113.12	1061811
11	491977.4688	3186149.25	61693.20	94.27	1121024
12	492011.6875	3186243.25	55389.62	84.64	1081502
13	492045.875	3186337	52990.82	80.98	1091724
14	492080.0938	3186431	49605.16	75.80	1092007
15	492001.25	3185808.25	135332.39	206.80	1051303
16	492051.25	3185895	93444.93	142.80	1071103
17	492101.25	3185981.5	77059.55	117.76	1020609
18	492151.25	3186068.25	73244.38	111.93	1071808
19	492201.25	3186154.75	63728.01	97.38	1070703
20	492251.25	3186241.25	52526.01	80.27	1020602
21	492301.25	3186328	51159.04	78.18	1072810
22	492115.4688	3185728.25	134115.98	204.95	1080905
23	492179.75	3185805	103976.62	158.89	1061603
24	492244.0313	3185881.5	81364.76	124.34	1060106
25	492308.3125	3185958.25	75755.52	115.76	1061510
26	492372.5938	3186034.75	65186.07	99.61	1042502
27	492436.875	3186111.25	61971.49	94.70	1070805
28	492501.1563	3186188	58989.13	90.14	1070805
29	492214.0938	3185629.75	153621.38	234.75	1051305
30	492290.6875	3185694	123525.54	188.76	1030224
31	492367.2813	3185758.25	104684.19	159.97	1030224
32	492443.9063	3185822.5	90692.77	138.59	1081404
33	492520.5	3185886.75	79869.02	122.05	1060901
34	492597.0938	3185951	71633.77	109.47	1030224
35	492673.7188	3186015.5	64562.67	98.66	1030224
36	492294.0625	3185515.5	195183.30	298.26	1092010
37	492380.6875	3185565.5	158432.80	242.11	1012411
38	492467.2813	3185615.5	127648.96	195.06	1092010
39	492553.875	3185665.5	107319.29	164.00	1032502
40	492640.4688	3185715.5	95605.52	146.10	1032324
41	492727.0938	3185765.5	86726.28	132.53	1012411
42	492813.6875	3185815.5	76542.14	116.97	1041405
43	492353	3185389	106822.74	163.24	1061408

44	492446.9688	3185423.25	104503.72	159.69	1080911
45	492540.9375	3185457.5	94416.94	144.28	1061408
46	492634.9063	3185491.75	96827.91	147.97	1052005
47	492728.875	3185526	67218.44	102.72	1061707
48	492822.8438	3185560.25	58691.67	89.69	1060806
49	492916.8125	3185594.25	64907.16	99.19	1082007
50	492389.0938	3185254.5	81161.27	124.02	1090810
51	492487.5625	3185271.75	69886.27	106.79	1051801
52	492586.0625	3185289.25	69575.09	106.32	1012703
53	492684.5313	3185306.5	64292.27	98.25	1081911
54	492783.0313	3185324	59727.53	91.27	1051805
55	492881.5	3185341.25	47042.42	71.89	1051805
56	492979.9688	3185358.5	43382.93	66.29	1082606
57	492401.25	3185115.5	73583.70	112.45	1082408
58	492501.25	3185115.5	62348.79	95.28	1090810
59	492601.25	3185115.5	56430.46	86.23	1090810
60	492701.25	3185115.5	55005.30	84.05	1090810
61	492801.25	3185115.5	50637.61	77.38	1053101
62	492901.25	3185115.5	44552.93	68.08	1012702
63	493001.25	3185115.5	40451.04	61.81	1052604
64	492389.0938	3184976.5	57794.30	88.32	1012406
65	492487.5625	3184959.25	56502.46	86.34	1010124
66	492586.0625	3184941.75	52228.68	79.81	1031006
67	492684.5313	3184924.5	42309.88	64.65	1102301
68	492783.0313	3184907	40024.84	61.16	1102301
69	492881.5	3184889.75	37251.48	56.92	1081008
70	492979.9688	3184872.5	36866.41	56.34	1012712
71	492353	3184842	52580.69	80.35	1082107
72	492446.9688	3184807.75	49621.47	75.83	1032624
73	492540.9375	3184773.5	49208.36	75.20	1030803
74	492634.9063	3184739.25	44769.27	68.41	1030803
75	492728.875	3184705	40926.66	62.54	1012403
76	492822.8438	3184670.75	40894.62	62.49	1082410
77	492916.8125	3184636.75	38296.25	58.52	1082410
78	492294.0625	3184715.5	51856.54	79.24	1061409
79	492380.6875	3184665.5	44808.38	68.47	1032624
80	492467.2813	3184615.5	44063.26	67.33	1123006
81	492553.875	3184565.5	39622.05	60.55	1123006
82	492640.4688	3184515.5	34826.75	53.22	1032624
83	492727.0938	3184465.5	35922.05	54.89	1012402
84	492813.6875	3184415.5	32513.68	49.68	1012406
85	492214.0938	3184601.25	51974.08	79.42	1040502
86	492290.6875	3184537	47988.25	73.33	1040203
87	492367.2813	3184472.75	39249.77	59.98	1040203
88	492443.9063	3184408.5	34091.43	52.10	1082107
89	492520.5	3184344.25	34638.09	52.93	1061409
90	492597.0938	3184280	30693.84	46.90	1081102
91	492673.7188	3184215.5	30414.10	46.48	1110902

92	492115.4688	3184502.75	42701.45	65.25	1092705
93	492179.75	3184426	33472.19	51.15	1032624
94	492244.0313	3184349.5	31369.60	47.94	1040502
95	492308.3125	3184272.75	36481.43	55.75	1040502
96	492372.5938	3184196.25	34417.51	52.59	1010104
97	492436.875	3184119.75	34248.81	52.34	1040203
98	492501.1563	3184043	32130.12	49.10	1040203
99	492001.25	3184422.75	46126.89	70.49	1120704
100	492051.25	3184336	42260.12	64.58	1011104
101	492101.25	3184249.5	38777.37	59.26	1042804
102	492151.25	3184162.75	34289.61	52.40	1121603
103	492201.25	3184076.25	29568.89	45.18	1092705
104	492251.25	3183989.75	24881.32	38.02	1061409
105	492301.25	3183903	22288.56	34.06	1110902
106	491874.875	3184363.75	38752.63	59.22	1070804
107	491909.0625	3184269.75	34971.20	53.44	1010104
108	491943.2813	3184175.75	35060.41	53.58	1120202
109	491977.4688	3184081.75	33547.94	51.27	1122201
110	492011.6875	3183987.75	32097.70	49.05	1020406
111	492045.875	3183894	31174.36	47.64	1120704
112	492080.0938	3183800	28668.58	43.81	1120704
113	491740.1563	3184327.75	45754.01	69.92	1082304
114	491757.5313	3184229.25	40123.66	61.31	1100403
115	491774.9063	3184130.75	36541.87	55.84	1091703
116	491792.25	3184032.25	34454.06	52.65	1062706
117	491809.625	3183933.75	31102.07	47.53	1062706
118	491827	3183835.25	27679.82	42.30	1070804
119	491844.3438	3183736.75	25908.03	39.59	1042802
120	491601.25	3184315.5	40131.86	61.33	1031007
121	491601.25	3184215.5	37087.93	56.67	1031007
122	491601.25	3184115.5	34030.43	52.00	1122707
123	491601.25	3184015.5	32675.45	49.93	1051104
124	491601.25	3183915.5	30638.48	46.82	1031007
125	491601.25	3183815.5	29069.07	44.42	1031007
126	491601.25	3183715.5	29219.92	44.65	1100403
127	491462.3438	3184327.75	51683.48	78.98	1062706
128	491444.9688	3184229.25	48777.75	74.54	1062706
129	491427.5938	3184130.75	45078.77	68.89	1062706
130	491410.25	3184032.25	42050.79	64.26	1042805
131	491392.875	3183933.75	38394.81	58.67	1091703
132	491375.5	3183835.25	36296.24	55.47	1091703
133	491358.1563	3183736.75	34009.70	51.97	1032408
134	491327.625	3184363.75	64385.30	98.39	1080810
135	491293.4375	3184269.75	53093.43	81.13	1080810
136	491259.2188	3184175.75	48027.71	73.39	1082305
137	491225.0313	3184081.75	45439.63	69.44	1082305
138	491190.8125	3183987.75	42610.12	65.11	1091701
139	491156.625	3183894	39283.26	60.03	1122707

140	491122.4063	3183800	35644.14	54.47	1021205
141	491201.25	3184422.75	59294.61	90.61	1091704
142	491151.25	3184336	52983.98	80.97	1091704
143	491101.25	3184249.5	48644.35	74.33	1022701
144	491051.25	3184162.75	44953.58	68.69	1022701
145	491001.25	3184076.25	41881.82	64.00	1022701
146	490951.25	3183989.75	39246.90	59.97	1022701
147	490901.25	3183903	36937.14	56.44	1022701
148	491087.0313	3184502.75	41274.99	63.07	1011610
149	491022.75	3184426	35831.88	54.76	1061804
150	490958.4688	3184349.5	34089.02	52.09	1061804
151	490894.1875	3184272.75	30595.93	46.75	1062611
152	490829.9063	3184196.25	25577.68	39.09	1062611
153	490765.625	3184119.75	20989.69	32.07	1062611
154	490701.3438	3184043	17012.20	26.00	1062611
155	490988.4063	3184601.25	47218.21	72.16	1011610
156	490911.8125	3184537	45307.71	69.24	1011610
157	490835.2188	3184472.75	43653.76	66.71	1011610
158	490758.5938	3184408.5	42151.66	64.41	1011610
159	490682	3184344.25	40497.10	61.88	1120913
160	490605.4063	3184280	38224.46	58.41	1120913
161	490528.7813	3184215.5	36119.23	55.19	1120913
162	490908.4375	3184715.5	53730.40	82.11	1121207
163	490821.8125	3184665.5	50743.44	77.54	1120913
164	490735.2188	3184615.5	46262.12	70.69	1082907
165	490648.625	3184565.5	41190.38	62.94	1082907
166	490562.0313	3184515.5	36150.40	55.24	1082907
167	490475.4063	3184465.5	31345.29	47.90	1082907
168	490388.8125	3184415.5	29396.08	44.92	1071410
169	490849.5	3184842	55033.07	84.10	1052404
170	490755.5313	3184807.75	55564.39	84.91	1061805
171	490661.5625	3184773.5	50580.72	77.29	1061805
172	490567.5938	3184739.25	45522.68	69.56	1061805
173	490473.625	3184705	42355.64	64.72	1121303
174	490379.6563	3184670.75	42971.17	65.67	1112407
175	490285.6875	3184636.75	43260.23	66.11	1112407
176	490813.4063	3184976.5	81748.67	124.92	1100401
177	490714.9375	3184959.25	76457.16	116.84	1061502
178	490616.4375	3184941.75	70455.23	107.66	1110802
179	490517.9688	3184924.5	58575.15	89.51	1110802
180	490419.4688	3184907	48164.16	73.60	1110802
181	490321	3184889.75	48612.64	74.29	1091708
182	490222.5313	3184872.5	41145.33	62.88	1091802
183	490801.25	3185115.5	95473.77	145.90	1112807
184	490701.25	3185115.5	86983.56	132.92	1112807
185	490601.25	3185115.5	72589.07	110.93	1120724
186	490501.25	3185115.5	67488.96	103.13	1011801
187	490401.25	3185115.5	63787.49	97.48	1020807

188	490301.25	3185115.5	60634.99	92.66	1042306
189	490201.25	3185115.5	56056.64	85.66	1011609
190	490813.4063	3185254.5	81663.48	124.79	1072801
191	490714.9375	3185271.75	75452.16	115.30	1110723
192	490616.4375	3185289.25	68472.29	104.63	1121309
193	490517.9688	3185306.5	61331.48	93.72	1091103
194	490419.4688	3185324	55621.34	85.00	1040707
195	490321	3185341.25	50493.35	77.16	1062003
196	490222.5313	3185358.5	48679.83	74.39	1090601
197	490849.5	3185389	68585.43	104.81	1112902
198	490755.5313	3185423.25	63242.15	96.64	1081205
199	490661.5625	3185457.5	57444.81	87.78	1121224
200	490567.5938	3185491.75	50933.72	77.83	1011802
201	490473.625	3185526	46480.61	71.03	1080104
202	490379.6563	3185560.25	43554.54	66.56	1121301
203	490285.6875	3185594.25	40806.04	62.36	1121504
204	490908.4375	3185515.5	64965.16	99.27	1040224
205	490821.8125	3185565.5	54847.53	83.81	1040224
206	490735.2188	3185615.5	47618.15	72.77	1121401
207	490648.625	3185665.5	44980.23	68.74	1092401
208	490562.0313	3185715.5	40846.48	62.42	1020802
209	490475.4063	3185765.5	37573.25	57.42	1020802
210	490388.8125	3185815.5	33996.07	51.95	1020802
211	490988.4063	3185629.75	53144.43	81.21	1112308
212	490911.8125	3185694	48502.21	74.12	1020909
213	490835.2188	3185758.25	44051.01	67.32	1020909
214	490758.5938	3185822.5	40629.16	62.09	1080401
215	490682	3185886.75	37903.26	57.92	1112923
216	490605.4063	3185951	37367.57	57.10	1020802
217	490528.7813	3186015.5	35248.44	53.86	1020802
218	491087.0313	3185728.25	53060.73	81.08	1080406
219	491022.75	3185805	50238.05	76.77	1031501
220	490958.4688	3185881.5	48660.09	74.36	1121005
221	490894.1875	3185958.25	44574.71	68.12	1121005
222	490829.9063	3186034.75	39888.80	60.96	1120803
223	490765.625	3186111.25	38860.67	59.38	1020909
224	490701.3438	3186188	36704.25	56.09	1020909
225	491201.25	3185808.25	57279.56	87.53	1112503
226	491151.25	3185895	52154.97	79.70	1112502
227	491101.25	3185981.5	49095.69	75.02	1083102
228	491051.25	3186068.25	46203.36	70.60	1081307
229	491001.25	3186154.75	43688.52	66.76	1020610
230	490951.25	3186241.25	40150.27	61.35	1121202
231	490901.25	3186328	36217.08	55.34	1081906
232	491327.625	3185867.25	61073.18	93.33	1020909
233	491293.4375	3185961.25	56952.64	87.03	1081307
234	491259.2188	3186055.25	52897.56	80.83	1052703
235	491225.0313	3186149.25	47569.73	72.69	1112223

236	491190.8125	3186243.25	42743.18	65.32	1052703
237	491156.625	3186337	39841.55	60.88	1031202
238	491122.4063	3186431	38879.52	59.41	1083002
239	491462.3438	3185903.25	66720.76	101.96	1052703
240	491444.9688	3186001.75	62725.26	95.85	1091906
241	491427.5938	3186100.25	50619.75	77.35	1031202
242	491410.25	3186198.75	48094.41	73.49	1091906
243	491392.875	3186297.25	45025.82	68.81	1091905
244	491375.5	3186395.75	41878.51	64.00	1083008
245	491358.1563	3186494.25	36912.29	56.41	1022508
246	491601.25	3185915.5	73155.58	111.79	1031202
247	491601.25	3186015.5	60921.38	93.10	1091906
248	491601.25	3186115.5	58437.00	89.30	1022508
249	491601.25	3186215.5	51064.34	78.03	1090105
250	491601.25	3186315.5	48002.10	73.35	1112301
251	491601.25	3186415.5	46384.53	70.88	1112306
252	491601.25	3186515.5	44049.35	67.31	1122801
253	491545.5	3185868	83360.79	127.39	1083002
254	491545.5	3185768	89942.55	137.44	1052703
255	491545.5	3185668	102628.04	156.83	1080802
256	491645.5	3185668	167926.61	256.61	1112503
257	491745.5	3185668	240698.30	367.82	1071803
258	491845.5	3185668	202266.41	309.09	1112301
259	491945.5	3185668	209717.23	320.47	1061811
260	492045.5	3185668	185618.33	283.65	1072810
261	492145.5	3185668	145800.52	222.80	1052901
262	492145.5	3185568	209902.23	320.76	1082403
263	492145.5	3185468	414547.88	633.48	1092010
264	492145.5	3185368	230893.67	352.83	1041403
265	492145.5	3185268	166703.41	254.74	1100703
266	492145.5	3185168	141290.41	215.91	1012402
267	492145.5	3185068	97516.78	149.02	1123006
268	492145.5	3184968	73125.59	111.75	1022112
269	492145.5	3184868	74244.23	113.45	1110707
270	492145.5	3184768	62017.05	94.77	1040502
271	492145.5	3184668	41457.15	63.35	1012402
272	492145.5	3184568	37862.32	57.86	1010104
273	492045.5	3184568	52548.57	80.30	1082602
274	491945.5	3184568	50091.03	76.55	1020406
275	491845.5	3184568	54350.53	83.05	1062706
276	491745.5	3184568	51921.62	79.34	1080810
277	491645.5	3184568	51146.82	78.16	1021205
278	491545.5	3184568	56596.83	86.49	1042802
279	491445.5	3184568	94719.48	144.74	1032408
280	491345.5	3184568	92216.73	140.92	1091701
281	491245.5	3184568	60085.66	91.82	1022701
282	491145.5	3184568	47741.64	72.96	1062611
283	491045.5	3184568	53007.98	81.00	1072605

284	491045.5	3184668	49927.66	76.30	1031011
285	491045.5	3184768	55991.76	85.56	1050201
286	491045.5	3184868	62657.12	95.75	1120913
287	491045.5	3184968	72505.36	110.80	1061805
288	491045.5	3185068	106004.99	161.99	1100401
289	491045.5	3185168	125514.09	191.80	1121707
290	491045.5	3185268	111308.18	170.09	1071707
291	491045.5	3185368	86049.50	131.49	1112902
292	491045.5	3185468	79334.51	121.23	1040224
293	491145.5	3185468	88336.45	134.99	1072806
294	491145.5	3185568	69258.41	105.84	1112502
295	491245.5	3185568	79482.45	121.46	1121202
296	491245.5	3185668	66574.55	101.73	1072705
297	491245.5	3185768	60807.68	92.92	1091905
298	491345.5	3185768	66989.70	102.37	1112303
299	491345.5	3185868	60970.54	93.17	1092407
300	491445.5	3185868	71903.35	109.88	1052703

2nd Quarter 2008

Receptor #	X (meters)	Y (meters)	Concentration (ug/m^s)	Concentration (ppm)	Year, Day, Time
1	491740.1563	3185903.25	104239.2578	159.29	1022508
2	491757.5313	3186001.75	90200.78125	137.84	1112301
3	491774.9063	3186100.25	83206.65625	127.15	1112306
4	491792.25	3186198.75	77208.38281	117.98	1020108
5	491809.625	3186297.25	70571.85938	107.84	1052806
6	491827	3186395.75	64078.4375	97.92	1121104
7	491844.3438	3186494.25	58775.83203	89.82	1081107
8	491874.875	3185867.25	134087.1875	204.90	1021609
9	491909.0625	3185961.25	116555.4141	178.11	1021602
10	491943.2813	3186055.25	96604.38281	147.62	1031503
11	491977.4688	3186149.25	86999.67969	132.95	1061811
12	492011.6875	3186243.25	76497.27344	116.90	1081908
13	492045.875	3186337	73607.49219	112.48	1081502
14	492080.0938	3186431	72331.36719	110.53	1091724
15	492001.25	3185808.25	151681.5	231.79	1081908
16	492051.25	3185895	146016.125	223.13	1060103
17	492101.25	3185981.5	121975.5	186.39	1051303
18	492151.25	3186068.25	110866.8281	169.42	1073002
19	492201.25	3186154.75	106224.9375	162.32	1071808
20	492251.25	3186241.25	99645.90625	152.27	1070703
21	492301.25	3186328	90419.89062	138.17	1020602
22	492115.4688	3185728.25	196598.5781	300.43	1062103
23	492179.75	3185805	183461.4844	280.35	1080905
24	492244.0313	3185881.5	167964.2813	256.67	1061603
25	492308.3125	3185958.25	146915.9063	224.51	1082501
26	492372.5938	3186034.75	127727.2109	195.18	1060106
27	492436.875	3186111.25	117419.5703	179.43	1052901
28	492501.1563	3186188	111926.2578	171.04	1061510
29	492214.0938	3185629.75	314158.1563	480.07	1081810
30	492290.6875	3185694	252887.6563	386.44	1051305
31	492367.2813	3185758.25	222481.375	339.98	1012407
32	492443.9063	3185822.5	190524.7031	291.15	1022201
33	492520.5	3185886.75	166849.9688	254.97	1012407
34	492597.0938	3185951	146319.5938	223.59	1030224
35	492673.7188	3186015.5	132824.25	202.97	1030224
36	492294.0625	3185515.5	307003.2813	469.14	1092010
37	492380.6875	3185565.5	262373.2188	400.94	1032324
38	492467.2813	3185615.5	226084.0625	345.48	1053001
39	492553.875	3185665.5	194459.6094	297.16	1053001
40	492640.4688	3185715.5	175042.625	267.49	1081408
41	492727.0938	3185765.5	160561.3594	245.36	1092106
42	492813.6875	3185815.5	147831.0313	225.90	1092106
43	492353	3185389	239626.0625	366.18	1052005

44	492446.9688	3185423.25	197836.8906	302.32	1080911
45	492540.9375	3185457.5	182765.0469	279.29	1060806
46	492634.9063	3185491.75	180155.75	275.30	1082007
47	492728.875	3185526	166155.8125	253.91	1112001
48	492822.8438	3185560.25	157281.0781	240.35	1112001
49	492916.8125	3185594.25	146691.7188	224.16	1112001
50	492389.0938	3185254.5	149468.0469	228.41	1051805
51	492487.5625	3185271.75	134578.2813	205.65	1051805
52	492586.0625	3185289.25	127960.5	195.54	1032302
53	492684.5313	3185306.5	114281.1719	174.64	1032302
54	492783.0313	3185324	101276.6875	154.76	1032302
55	492881.5	3185341.25	84957.04688	129.82	1032302
56	492979.9688	3185358.5	83737.5	127.96	1052005
57	492401.25	3185115.5	137526.1875	210.16	1051801
58	492501.25	3185115.5	144913.1563	221.45	1061402
59	492601.25	3185115.5	138780.0625	212.07	1060905
60	492701.25	3185115.5	122235.4922	186.79	1012703
61	492801.25	3185115.5	107475.875	164.24	1051805
62	492901.25	3185115.5	103430.2109	158.05	1060905
63	493001.25	3185115.5	94485.89062	144.39	1060905
64	492389.0938	3184976.5	120376.9531	183.95	1120907
65	492487.5625	3184959.25	112857.5078	172.46	1051904
66	492586.0625	3184941.75	106138.0078	162.19	1053101
67	492684.5313	3184924.5	95355.64844	145.72	1053101
68	492783.0313	3184907	89703.05469	137.08	1012702
69	492881.5	3184889.75	82416.59375	125.94	1012702
70	492979.9688	3184872.5	77709.33594	118.75	1012702
71	492353	3184842	104116.3828	159.10	1112003
72	492446.9688	3184807.75	89267.1875	136.41	1120102
73	492540.9375	3184773.5	76893.02344	117.50	1102301
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75	492728.875	3184705	72547.25	110.86	1012712
76	492822.8438	3184670.75	68775.39062	105.10	1081008
77	492916.8125	3184636.75	67193.55469	102.68	1012712
78	492294.0625	3184715.5	87018.85156	132.98	1070811
79	492380.6875	3184665.5	86223.70312	131.76	1030803
80	492467.2813	3184615.5	77213.75	117.99	1030803
81	492553.875	3184565.5	73799.89062	112.78	1031006
82	492640.4688	3184515.5	71666.85156	109.52	1082410
83	492727.0938	3184465.5	69289.90625	105.88	1082410
84	492813.6875	3184415.5	66642.98438	101.84	1082410
85	492214.0938	3184601.25	79020.76562	120.75	1010104
86	492290.6875	3184537	72657.85938	111.03	1100703
87	492367.2813	3184472.75	68779.47656	105.10	1082604
88	492443.9063	3184408.5	65700.33594	100.40	1012402
89	492520.5	3184344.25	62632.25781	95.71	1012406
90	492597.0938	3184280	59540.28125	90.98	1012406
91	492673.7188	3184215.5	56093.72266	85.72	1012403

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93	492179.75	3184426	68296.41406	104.37	1112111
94	492244.0313	3184349.5	61978.53516	94.71	1061409
95	492308.3125	3184272.75	57899.84375	88.48	1081102
96	492372.5938	3184196.25	55932.46484	85.47	1081102
97	492436.875	3184119.75	53964.74609	82.46	1032624
98	492501.1563	3184043	52193.70312	79.76	1081102
99	492001.25	3184422.75	70016.57812	106.99	1082602
100	492051.25	3184336	65369.86328	99.89	1121603
101	492101.25	3184249.5	57757.77734	88.26	1112111
102	492151.25	3184162.75	54750.41797	83.67	1112607
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105	492301.25	3183903	48595.49219	74.26	1040502
106	491874.875	3184363.75	71005.0625	108.50	1081104
107	491909.0625	3184269.75	65350.53906	99.86	1122201
108	491943.2813	3184175.75	61239.00391	93.58	1081104
109	491977.4688	3184081.75	56854.51562	86.88	1110803
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111	492045.875	3183894	50147.32422	76.63	1082602
112	492080.0938	3183800	48118.76562	73.53	1082602
113	491740.1563	3184327.75	77662.65625	118.68	1121907
114	491757.5313	3184229.25	70346.78906	107.50	1100403
115	491774.9063	3184130.75	63846.03125	97.56	1062706
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118	491827	3183835.25	51545.39453	78.77	1081104
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121	491601.25	3184215.5	74503.57812	113.85	1111206
122	491601.25	3184115.5	66979.38281	102.35	1122707
123	491601.25	3184015.5	63113.12109	96.44	1051104
124	491601.25	3183915.5	58632.96875	89.60	1121305
125	491601.25	3183815.5	57049.51562	87.18	1100403
126	491601.25	3183715.5	55120.58984	84.23	1121907
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130	491410.25	3184032.25	70103.89844	107.13	1091701
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132	491375.5	3183835.25	57261.30078	87.50	1111206
133	491358.1563	3183736.75	56042.78125	85.64	1111206
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135	491293.4375	3184269.75	85373.35156	130.46	1091704
136	491259.2188	3184175.75	72656.82031	111.03	1091707
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138	491190.8125	3183987.75	68577.96094	104.80	1121908
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143	491101.25	3184249.5	56875.51953	86.91	1022701
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145	491001.25	3184076.25	51425.17188	78.58	1022701
146	490951.25	3183989.75	49130.28125	75.08	1022701
147	490901.25	3183903	47038.86328	71.88	1022701
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151	490894.1875	3184272.75	49020.42578	74.91	1062611
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256	491645.5	3185668	144030.1875	220.10	1092407
257	491745.5	3185668	174008.7813	265.91	1072705
258	491845.5	3185668	181291.3125	277.04	1012803
259	491945.5	3185668	268867.1563	410.86	1022607
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266	492145.5	3185168	225641.5469	344.81	1013108
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291	491045.5	3185368	190563.3594	291.20	1020908
292	491045.5	3185468	156096.3594	238.53	1040224
293	491145.5	3185468	164342.75	251.14	1072806
294	491145.5	3185568	127418.7813	194.71	1112503
295	491245.5	3185568	133011.5156	203.26	1083102
296	491245.5	3185668	145221.5781	221.92	1121005
297	491245.5	3185768	127801.9766	195.30	1121202
298	491345.5	3185768	120523.1172	184.17	1040307
299	491345.5	3185868	98550.71094	150.60	1083008
300	491445.5	3185868	93173.53125	142.38	1091905

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