Bridgeton Landfill LLC

April 24, 2015

Mr. Kendall B. Hale
Permit Section Chief
Missouri Department of Natural Resources – Air Pollution Control Program
P.O. Box 176
Jefferson City, MO 65102-0176

RE: Preliminary Air Modeling Protocol – Request for Approval
Bridgeton Landfill

Dear Mr. Hale:

As stated in our April 20, 2015 response to MDNR, on behalf of Bridgeton Landfill, Trinity Consultants (Trinity) has prepared a preliminary air modeling protocol for MDNR review and approval prior to conducting the air dispersion modeling.

If you have any questions or comments about the information presented in this letter, please do not hesitate to contact me at (314) 744-8139.

Sincerely,

Bridgeton Landfill, LLC

James Getting

James A. Getting, PE
Environmental Manager

cc: Ms. Darcy Bybee, MDNR/APCP Enforcement Chief
Ms. Kathrina Donegan. St. Louis County Department of Health
Mr. Tom Phillips, Missouri Attorney General's Office
Mr. Aaron Schmidt, Division of Environmental Quality
Mr. Chris Nagel, Solid Waste Management Program
Mr. Tom Markowski, St. Louis Regional Office
Mr. Russell Anderson, Bridgeton Landfill, LLC
Mr. Michael Liebert, Trinity Consultants

SO_2 NAAQS Modeling Protocol

Bridgeton Landfill, LLC. > Bridgeton, MO

(Privileged and Confidential)

Bridgeton Landfill LLC

Prepared By:

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April 2015

Project 152601.0041

Trinity Consultants

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1. INTRODUCTION

Bridgeton Landfill LLC. (Bridgeton Landfill) owns and operates a solid waste facility located at 13570 Saint Charles Rock Road in Bridgeton, Missouri. The landfill is inactive and no longer accepts solid waste.

Current operations at the inactive landfill facility are focused on controlling odors and managing landfill gas and liquids from the landfill. Concerning these operations, Bridgeton Landfill has conducted a control strategy and evaluation analysis of odor resulting in the Sulfur Removal Technology Evaluation, Stage 2 which was submitted to the Missouri Department of Natural Resources (MDNR) on January 23, 2015. In response, Kendall Hale of the MDNR, sent a letter to Mr. James Getting, Bridgeton Landfill, dated February 11, 2015 describing the steps and actions to take in order to satisfy the agency requirements for permit preparation and demonstrated compliance with the National Ambient Air Quality Standards (NAAQS) for SO_2.

To this end, Bridgeton Landfill is submitting this modeling protocol to perform dispersion modeling of Sulfur Dioxide (SO_2) for emissions associated with sources at the landfill. The objective is to perform SO_2 modeling to demonstrate compliance with the USEPA NAAQS for SO_2 at all locations around the facility.

Bridgeton Landfill is submitting this air quality modeling protocol to the MDNR as a written description of the proposed modeling procedures, model selection and applicability, and data resources in order to properly determine Bridgeton Landfill's compliance with the NAAQS. All modeling will be conducted in accordance with this protocol once it is approved by the MDNR. The modeling focuses on SO_2 emissions from the four onsite flares which serve to destroy captured landfill gases from the overall gas extraction system at the facility. Of particular interest are the associated emissions of H_2S, and other sulfur bearing compounds as a source of SO_2 emissions and the related ambient air impact estimates in the surrounding communities.

2. DESCRIPTION OF FACILITY AND PROJECT

2.1. DESCRIPTION OF FACILITY

Bridgeton Landfill operates under Title V permit OP-2010-063 which was issued on June 23, 2010. Since then a renewal application has been submitted by Bridgeton Landfill with project number 0120-131-11-02 on September 15, 2014. The facility is located at 13570 St. Charles Rock Road in Bridgeton, Missouri. Figure 2-1 shows the general outline of the facility with pertinent flares to be modeled and buildings shown in the southern portion of the landfill. The landfill is permitted for municipal solid waste disposal, which it began accepting in 1979 and ceased accepting in 2005. The landfill utilizes a gas collection control system to comply with New Source Performance Standards (NSPS) Subpart WWW.

2.2. POLLUTANTS EVALUATED

The modeling analysis will address the impacts of SO_2 emissions from the four flares and the regenerative thermal oxidizers (RTOs) in order to ascertain that the Bridgeton Landfill is in compliance with the NAAQS for sulfur dioxide (SO_2). All modeled concentrations will be presented with respect to the NAAQS standard which is 75 ppb or if represented in terms of micrograms per cubic meter ($\mu g/m^3$) on a 1-hr average is approximately 196.5.

2.3. GENERAL MODELING APPROACH

The air dispersion modeling analysis to be used for this project will be conducted in a manner that conforms to the applicable guidance and requirements of the dispersion modeling as given below:

- USEPA: *Guideline on Air Quality Models (Guideline)*[1].
- MDNR general permit modeling guidance[2]

This air dispersion modeling protocol is being submitted for review and approval by the MDNR prior to performing the air quality dispersion modeling analysis.

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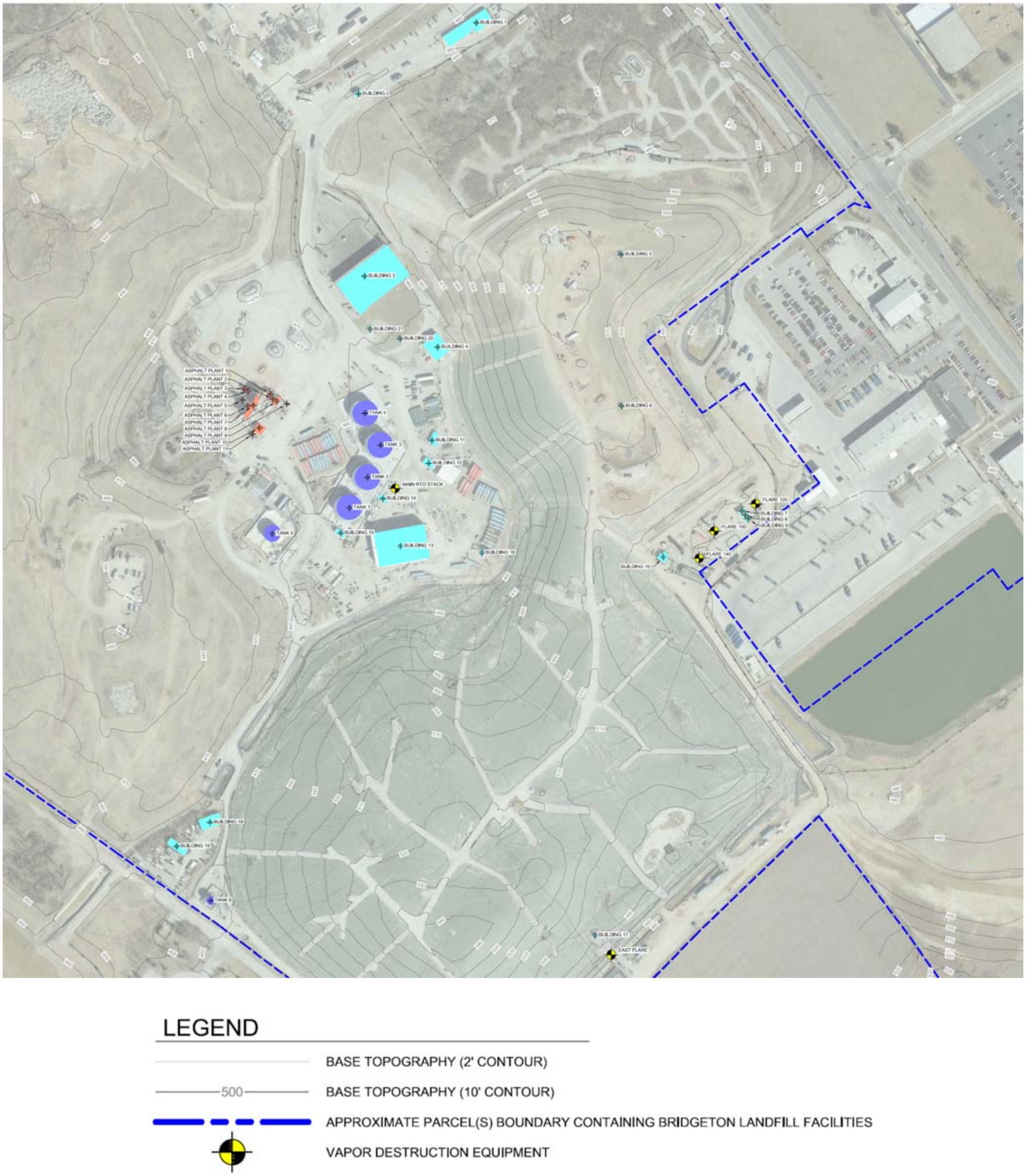
[1] Code of Federal Regulation, Title 40 – Protection of Environment, Part 51, Appendix W – *Guideline on Air Quality Models*, Appendix A.1 – AMS/EPA Regulatory Model (AERMOD).

[2] http://dnr.mo.gov/env/apcp/permitmodelingguidance.htm

Figure 2-1. Republic Services Bridgeton Landfill[3]



[3] PDF with further detail provided as Attachment A

3. AIR QUALITY DISPERSION MODELING

Bridgeton Landfill has prepared this modeling protocol to describe the modeling methodologies and data resources that will be used to conduct this modeling analysis.

3.1. DISPERSION MODEL SELECTION

Dispersion models predict the downwind constituent concentration by simulating the evolution of the constituent plume over time and space given data inputs. These data inputs include the quantity of emissions and the initial conditions of the stack exhaust to the atmosphere. According to the *Guideline*, the extent to which a specific air quality model is suitable for the evaluation of source impact depends on:

- The meteorological and topographical complexities of the area
- The level of detail and accuracy needed in the analysis
- The technical competence of those undertaking such simulation modeling
- The resources available
- The accuracy of the database (i.e., emissions inventory, meteorological, and air quality data)

Taking these factors into consideration and per the *Guideline* document, Bridgeton Landfill proposes to conduct dispersion modeling using the American Meteorological Society/Environmental Protection Agency Regulatory Model, AERMOD (Version 14134) to determine the areas of highest concentration of SO_2. AERMOD is the default model for evaluating impacts attributable to industrial facilities in the near-field (i.e., source receptor distances of less than 50 km), and is the recommended model in the *Guideline*. AERMOD is also a refined dispersion model that is widely used and accepted in the air quality community for various non-traditional and non-regulatory modeling applications.

AERMOD is a refined, steady-state, multiple source, Gaussian dispersion model that was promulgated in December 2005 as the preferred model in this type of air quality analysis. Incorporated into the AERMOD Model is the Plume Rise Modeling Enhancements (PRIME) algorithms, which allow the direction-specific building downwash dimensions determined by the Building Profile Input Program, PRIME version (BPIP PRIME) (Version 04274)[4] to be used in AERMOD. All buildings and structures that could potentially result in plume downwash of effluent from a stack or vent or flare are incorporated into the modeling analysis. BPIP PRIME is designed to incorporate the concepts and procedures expressed in the Good Engineering Practice (GEP) Technical Support Document, the Building Downwash Guidance document, and other related documents while incorporating the PRIME enhancements to improve prediction of ambient impacts in building cavities and wake regions[5].

The AERMOD modeling system is composed of three modular components:

- AERMAP - The terrain preprocessor
- AERMET – The meteorological preprocessor
- AERMOD – The control module and modeling processor

[4] Earth Tech, Inc., *Addendum to the ISC3 User's Guide, The PRIME Plume Rise and Building Downwash Model, Concord, MA.*
[5] U.S. Environmental Protection Agency, Office of Air Quality Planning and Standards, *Guidelines for Determination of Good Engineering Practice Stack Height (Technical Support Document for the Stack Height Regulations) (Revised),* Research Triangle Park, North Caroline, EPA 450/4-80-023R, June 1985.

AERMAP is the terrain preprocessor that is used to import terrain elevations for selected model objects and generate the receptor hill height scale data that are used by AERMOD to drive advanced terrain processing algorithms. National Elevation Dataset (NED) at 1/3-arc second resolution will be used to interpolate surveyed elevations for user specified receptor grids as well as the critical hill heights as required for terrain processing in AERMOD. The building and source elevations were based on proprietary in-house data within the Republic archives for the Bridgeton Landfill.

AERMET generates surface file and vertical profile file to pass meteorological observations and turbulence parameters to AERMOD. AERMET meteorological data are refined for a particular analysis based on the choice of micrometeorological parameters that are linked to the land use and land cover (LULC) around the particular facility and/or meteorological site. By using the raw surface and upper air station NWS observation data in AERMET, Bridgeton Landfill will create a complete set of model-ready meteorological data specific to this project. The details of AERMET processing are provided in Section 3.2 below.

Bridgeton will use *BREEZE*®-AERMOD v7.9.1.45 and the *BREEZE*®-AERMET v7.5.0.1 software, developed by Trinity Consultants, to assist in developing the model input files for AERMOD and AERMET, respectively. These software Graphical User Interface programs will incorporate the most recent versions of AERMOD (14134) and AERMET (14134), and AERMAP (11103) to estimate SO_2 concentrations from the modeled sources at Bridgeton Landfill. Using the procedures outlined in the *Guideline* as a reference, the AERMOD dispersion modeling for Bridgeton Landfill will be performed using all regulatory default options.

3.2. METEOROLOGICAL DATA

Site-specific dispersion models require a sequential hourly record of dispersion meteorology representative of the regions within which the source is located. In the absence of site-specific measurements, the *Guideline* suggests five years of reliable, quality assured and representative meteorological data to be used in regulatory modeling analyses. The representatives of a particular observation site should be evaluated with respect to four factors:

(1) The proximity of the meteorological monitoring site to the area under construction
(2) The complexity of the terrain
(3) The exposure of the meteorological monitoring site
(4) The period of time during which data are collected

Regulatory air quality modeling using the AERMOD system requires quality-assured meteorological data that includes hourly records of the following observed or calculated parameters:

- Wind speed
- Wind direction
- Air temperature
- Micrometeorological parameters (e.g., friction velocity, Monin-Obukhov length)
- Mechanical mixing height
- Convective mixing height

The first three of these parameters are directly measured by monitoring equipment located at typical surface observation stations. The friction velocity, Monin-Obukhov length, and mixing heights are derived from characteristic micrometeorological parameters and from observed and correlated values of cloud cover, solar insolation, time of day and year, and latitude of the surface observations station. Surface observation stations form a relatively dense network, are found primarily at airports which are typically operated by the National

Weather Service (NWS). Data are generally archived in an hourly format at the National Data Climatic Center (NCDC) in Asheville, North Carolina. Fewer upper air stations exist than surface observing points because the upper atmosphere is less susceptible to local effects caused by terrain or other land influences and is therefore less variable. The NWS operates virtually all available upper air measurement stations in the United States.

For the Bridgeton Landfill modeling the nearby St. Louis Lambert International Airport (STL, WBAN# 13994) surface NWS observation station will be used as a representative station for the modeling task. In accordance with the *Guideline* the most recent, readily available five years of meteorological data from the Lambert Airport station (i.e., 2010 to 2014) will be used in the air quality modeling analysis. During the five year data period, the anemometer height and base elevation for the St. Louis Lambert International Airport surface station were 10.06 meters and 161.85 meters, respectively as confirmed by the NOAA web pages[6]. Based on the proximity of Bridgeton Landfill, the Lincoln, Illinois (SPI, WBAN# 04833) upper air observation station was selected to provide the twice-daily upper air soundings to AERMET.

AERMET, the meteorological preprocessing program from AERMOD, is a 3-stage system. The first stage reads in and performs quality assurance/quality control (QA/QC) on the raw NWS surface and upper air data files. The second stage synchronizes the observation times and merges the surface and upper air files together. The last stage incorporates user-specified micrometeorological parameters (albedo, Bowen Ratio, surface roughness) with the observational data to compute the necessary variables for AERMOD (e.g., friction velocity, Monin-Obukhov length, etc.). Meteorological input files for this modeling analysis will be created by Bridgeton Landfill using the current version of AERMET (Version 14134) following the procedures described below.

The raw NWS surface data files and the raw upper air data will be reviewed and subject to QA/QC prior to processing in Stage 1 of AERMET. Once the surface and upper air data QA/QC and processing is completed, Stage 2 of AERMET combined this data into a single file and incorporates the hourly average wind speeds and directions calculated in AERMINUTE. Since, the upper air data are based on GMT, the observation times must be synchronized as well. Once the merge files are created, they will be combined with land use-specific surface characteristics (albedo, Bowen Ratio, surface roughness) in Stage 3 in order to create the AERMOD ready dataset. AERMET accepts surface characteristics as annual, seasonal, or monthly averages, over the number of user-specified horizontal sectors based on wind direction, ranging from 1 to 12. When applying the AERMET meteorological processor to process meteorological data for the AERMOD model, the user must determine appropriate values for three surface characteristics: surface roughness length {z_o}, albedo {r}, and Bowen ratio {B_o}. The AERSURFACE tool has been developed to aid users in obtaining realistic and reproducible surface characteristic values, including albedo, Bowen ratio, and surface roughness length, for input to AERMET. The tool uses publicly available national land cover datasets and look-up tables of surface characteristics that vary by land cover type and season.

In the past several years the USEPA has released AERMINUTE, a program capable of compiling hourly average wind speeds and wind directions using 1-minute wind data collected at Automated Surface Observation Stations (ASOS)[7]. The use of 1-minute wind data has been shown to reduce the number of calms and variable wind conditions ultimately processed in the final AERMOD computations. Bridgeton Landfill obtained five years of 1-minute wind data for the STL surface station and compiled hourly averages using AERMINUTE (Version 14337) for incorporation into Stage 2 processing of AERMET.

The Stage 3 processor combines the observational data with the surface characteristics to calculate the micrometeorological input parameters required by the AERMOD model. These parameters are output in the

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[6] https://gis.ncdc.noaa.gov/map/viewer/#app=cdo&cfg=cdo&theme=hourly&layers=1,
http://www.nws.noaa.gov/ops2/Surface/asosimplementation.htm

[7] AERMINUTE program is also compatible with the current version of AERMET (Version 14134).

.SFC and .PFL files that compose an AERMOD ready dataset. The surface characteristics will be input directly in Stage 3 of AERMET with no manipulations.

3.3. COORDINATE SYSTEM

The location of emission sources, structures, and receptors will be represented in the Universal Transverse Mercator (UTM) coordinate system. The UTM grid divides the world into coordinates that are measured in north meters (measured from the equator) and east meters (measured from the central meridian of a particular zone, which is set at 500 kilometers [km]). The datum for this modeling analysis is based on North American Datum 1983 (NAD83). Bridgeton Landfill is approximately centered at UTM, Zone 16, coordinates 722,044.1 m East and 4,294,058.7 m north using NAD83. UTM coordinates for this analysis all reside within UTM zone 16. Bridgeton Landfill will use to-scale plots and site plans for the facility projected in UTM NAD83 Zone 16 to digitize all model objects.

3.4. TREATMENT OF TERRAIN

Terrain will be included in the dispersion modeling to account for the differences between source base elevation and receptor elevations. The relations between the terrain feature and its associated receptors and each source depends on the individual source's effective plume height (physical height plume rise) and base elevation. AERMOD is capable of estimating impacts in both simple (less than stack height) and complex terrain (above stack height). Source elevations for receptors and base elevations for all inventory sources required by AERMOD will be determined using the AERMAP terrain preprocessor (version 11103), if necessary. Source elevations for all sources within Bridgeton Landfill's boundary will be determined using to-scale plot plans that include site specific elevation data. Terrain elevations from the USGS 1/3 arc-second NED data will be used for the AERMAP processing of receptors and inventory sources.

AERMAP will also calculate the hill height scale which is required for each receptor to allow AERMOD's terrain algorithm to property determine the impact of each source at each receptor. AERMOD computes the impact at a receptor as a weighted interpolation between horizontal (plume goes around a terrain feature) and terrain-following states (plume goes over a terrain feature) using a critical dividing streamline approach. This scheme assumes that part of the plume mass will have enough energy to ascend and traverse over a terrain feature and the remainder will impinge and traverse around a terrain feature under certain meteorological conditions. The hill height scale is computed by the AERMAP terrain pre-processor for each receptor as a measure of the one terrain feature in the modeling domain that would have the greatest effect on plume behavior at that receptor. The hill height scale does not represent the critical dividing streamline height itself, but supplies the computational algorithms with an indication of the relative relief within the modeling domain for the determination of the critical dividing streamline height for each hour of meteorological data.

3.5. RECEPTOR GRIDS[8]

In the air dispersion modeling analysis, ground level concentration will be calculated with four Cartesian receptor grids. These grids, along with fence-line receptors, cover an 11km radius measured from the center of the facility. Missouri guidance stipulates the full receptor grid should extend at least 10 km from every point in the property boundary; the furthest point of the property boundary from the center of the facility is approximately 1 km from the center-point, hence the 11 km radius grid. The receptor grids proposed for this modeling analysis include:

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[8] All grids designed in accordance with Missouri DNR *Receptor Grids, Terrain, and Locational Data* modeling guidance

- Fence Line Receptors: Fence line receptors will be arranged along Bridgeton Landfill's fence line boundary at 50m intervals.
- 100-meter Cartesian Grid: A fine grid will be arranged around the facility at a 100-meter spaced receptors extending 1 km from the property boundary.
- 250-meter Cartesian Grid: A medium grid will be arranged around the facility at a 250-meter spacing extending 2.5 km from the property boundary, exclusive of the receptors in the fine grid.
- 500-meter Cartesian Grid: A coarse grid will be arranged around the facility at a 500-meter spacing extending in a 5 km radius from the property boundary, exclusive of receptors in the medium grid.
- 1000-meter Cartesian Grid: An extra coarse grid will be arranged around the facility at a 1000-meter spacing extending in a 10 km radius from the property boundary, exclusive of receptors in the coarse grid.

For modeled concentrations greater than half the NAAQS standard outside the 100m grid described above, a nested 100m receptor grid will be placed on that receptor extending one half km in the four cardinal directions (1 km square). Please note that no receptor will be placed within the property that is restricted to the public (i.e., fence line and buildings) and Bridgeton Landfill will ensure fencing is in place surrounding the modeled property boundary to restrict access.

3.6. BUILDING DOWNWASH

The *Guideline* requires the evaluation of the potential for physical structures to affect the dispersion of emissions from stack sources. The exhaust from stacks that are located within specified distances of buildings may be subject to "aerodynamic building downwash" under certain meteorological conditions. This determination is made by comparing actual stack height to the GEP stack height. The modeled emission units and associated stacks and vents at Bridgeton Landfill will be evaluated in terms of their proximity to nearby structures. The locations and dimensions of the buildings that are used in the modeling analysis will be provided in the modeling report.

All Bridgeton Landfill stacks will be assumed to be subject to the effects of downwash if the release height is less than the minimum GEP stack height, which is defined by the following formula:

$$H_{GEP} = H + 1.5L$$

where,

H_{GEP}	=	EPA formula height,
H	=	structure height, and
L	=	lesser dimension of the structure (height or maximum projected width).

This equation is limited to stacks located within 5L of a structure. Stacks located at a distance greater than 5L are not subject to wake effects of the structure.

Direction-specific equivalent building dimensions used as input to the AERMOD model to simulate impacts of downwash are calculated using the *BREEZE*®-AERMOD v7.9.1.45 software developed by Trinity. This software incorporates the algorithms of the USEPA – sanctioned Building Profile Input Program (BPIP-PRIME). Using the building coordinates and dimensions, a GEP analysis of all stacks in relation to each building for each of the 36 wind directions will be performed to evaluate which building height and dimension have the greatest influence in terms of building downwash (enhanced dispersion) on the dispersion of each emission source. The complete results of the GEP analysis and building downwash input and output files will be provided in the final modeling report as part of the electronic modeling files.

3.7. BACKGROUND CONCENTRATIONS

The background concentration of SO_2 that is proposed to be used in the air dispersion analysis of the Bridgeton Landfill flares is the design value of the monitor closest to and most representative of the regional SO_2 concentrations near the Bridgeton Landfill, specifically the "Margaretta" monitor located at 4520 Margaretta, St. Louis, MO 63115. The 2014 design value (99th percentile) of this monitor is 22 ppb of SO_2. Bridgeton Landfill proposes to use this monitor with 2014 data because it is likely this background concentration is the best spatial-temporal representation of conditions in the proximity of the Bridgeton Landfill. The basis for this decision is supported by the Missouri DNR's *Background Concentrations* guidance for air dispersion modeling[9]. The design value of this monitor was obtained from the EPA Air Data page.[10] This "urban" type monitor should be a conservative estimate of natural background in the region as well as cumulative for regional industrial sources and other area wide anthropogenic emissions.

3.8. FLARE MODELING REPRESENTATION

As noted in the Bridgeton Landfill's response to the MDNR's February 11th and March 25th letters, provided to MDNR April 20th, Bridgeton Landfill is in the process of developing flare emission rates for the purposes of air dispersion modeling. These emission rates will be calculated using average volumetric concentration measurements for each of the constituent sulfur species, an assumed 98% complete combustion factor for all of the sulfur species, and an average landfill gas flow rate in units of standard cubic feet per minute (scfm).

The effective stack heights, stack diameters, stack exit velocities and stack exit temperatures will all be provided based on the guidance of the MDNR for air dispersion modeling of flares[11]. In particular, stack gas exit velocities and stack gas exit temperatures will be 20 meters per second and 1273 degrees K for all of the flares. Effective stack heights and effective stack diameters will be calculated as a function of total potential gross heat release and net heat available for plume rise, respectively. By default, net heat available for plume rise is typically calculated as 45% of total potential gross heat release, which operates under the assumption that the flare experiences a radiative heat loss factor of 55%, leaving only 45% of heat available for plume rise. Due to the unique composition of Landfill gas collected by the Bridgeton GCCS, appropriate site specific radiative heat loss factor will be evaluated by the flare Manufacturer, John Zink Hamworthy, and applied to the model if applicable.

[9] http://dnr.mo.gov/env/apcp/docs/backgroundconcentrations110512.pdf
[10] http://www.epa.gov/airdata/ad_rep_mon.html
[11] http://dnr.mo.gov/env/apcp/docs/pointsources.pdf

4. POSTPROCESSING, MODELING RESULTS AND FILES

Modeling for 1-hour averaging periods for SO_2 will be presented in the modeling report in a tabular format. Project impacts will be compared to the SO_2 1-hr averaging period NAAQS in the form of a direct comparison between the two in units of $\mu g/m^3$. Coordinates for each of the highest impacts will be provided. Plots showing the locations of highest impacts can also be provided upon request.

The air dispersion modeling analysis input and output data files, as well as the meteorological data and downwash files used, will be provided to the MDNR in electronic form. Hard copies of additional modeling output files (e.g., building downwash) will be submitted upon request of the MDNR.

If initial modeling results show non-compliance with the NAAQS, Bridgeton Landfill will at that time redefine some of the more conservative assumptions originally used to better represent actual operating conditions.

ATTACHMENT A: BRIDGETON LANDFILL SITE MAP

Flare. ID	Description	Height (ft)	Latitude	Longitude	Northing (Local Coord.)	Easting (Local Coord.)	Grnd. Elev.
FLARE 100	Landfill Gas Flare	40	38.76654426N	90.44131374W	1,067,927.18	516,766.38	479.67
FLARE 120	Landfill Gas Flare	45	38.76676435N	90.44089131W	1,068,007.43	516,886.78	479.70
FLARE 140	Landfill Gas Flare	45	38.76632538N	90.44146951W	1,067,847.43	516,722.02	482.04
EAST FLARE	Landfill Gas Flare	N/A	38.76314587N	90.44237373W	1,066,689.13	516,464.96	486.08
RTO	Regenerative Thermal Oxidizer	67	38.76689045N	90.44458098W	1,068,052.39	515,833.76	458.72

Bldg. ID	Description	Height (ft)	Northing (Local Coord.)	Easting (Local Coord.)	Grnd. Elev.
BUILDING 1	Main Office/Shop	13.4	1,069,458.38	516,096.42	460.96
BUILDING 1	Main Office/Shop	13.4	1,069,376.16	515,973.68	460.18
BUILDING 1	Main Office/Shop	13.4	1,069,348.65	515,992.12	460.13
BUILDING 1	Main Office/Shop	13.4	1,069,423.46	516,119.83	461.53
BUILDING 2	Scale House	15.1	1,069,200.24	515,720.15	459.88
BUILDING 2	Scale House	15.1	1,069,209.54	515,714.08	460.78
BUILDING 2	Scale House	15.1	1,069,220.98	515,731.60	460.50
BUILDING 2	Scale House	15.1	1,069,211.68	515,737.67	460.18
BUILDING 3	Transfer Station	34.1	1,068,653.76	515,662.05	461.41
BUILDING 3	Transfer Station	34.1	1,068,766.71	515,809.66	460.85
BUILDING 3	Transfer Station	34.1	1,068,678.96	515,876.81	460.25
BUILDING 3	Transfer Station	34.1	1,068,565.58	515,729.54	461.60
BUILDING 4	Transfer Station Shop	25.5	1,068,473.19	515,915.43	458.29
BUILDING 4	Transfer Station Shop	25.5	1,068,507.34	515,955.51	458.55
BUILDING 4	Transfer Station Shop	25.5	1,068,460.62	515,995.30	458.39
BUILDING 4	Transfer Station Shop	25.5	1,068,426.48	515,955.22	458.10
BUILDING 5	LCS 1B Building	7.2	1,068,739.99	516,488.55	515.29
BUILDING 5	LCS 1B Building	7.2	1,068,744.28	516,495.87	514.62
BUILDING 5	LCS 1B Building	7.2	1,068,737.63	516,499.77	514.54
BUILDING 5	LCS 1B Building	7.2	1,068,733.33	516,492.46	514.93
BUILDING 6	LCS 5 Building	7.2	1,068,294.64	516,489.68	513.31
BUILDING 6	LCS 5 Building	7.2	1,068,299.43	516,496.74	512.88
BUILDING 6	LCS 5 Building	7.2	1,068,292.75	516,501.38	512.70
BUILDING 6	LCS 5 Building	7.2	1,068,287.89	516,493.51	513.25
BUILDING 7	Generator	12.9	1,067,984.09	516,836.81	479.75
BUILDING 7	Generator	12.9	1,067,995.78	516,853.20	479.81
BUILDING 7	Generator	12.9	1,067,988.99	516,858.18	479.78
BUILDING 7	Generator	12.9	1,067,977.21	516,841.64	479.72
BUILDING 8	Air Compressor # 1	8.4	1,067,971.88	516,845.53	479.70
BUILDING 8	Air Compressor # 1	8.4	1,067,965.00	516,850.36	479.67
BUILDING 8	Air Compressor # 1	8.4	1,067,983.58	516,861.91	479.77
BUILDING 8	Air Compressor # 1	8.4	1,067,976.78	516,866.90	479.74
BUILDING 9	Air Compressor # 2	8.4	1,067,959.76	516,854.33	479.65
BUILDING 9	Air Compressor # 2	8.4	1,067,971.39	516,870.74	479.73
BUILDING 9	Air Compressor # 2	8.4	1,067,964.52	516,875.70	479.70
BUILDING 9	Air Compressor # 2	8.4	1,067,952.80	516,859.08	479.62
BUILDING 10	Compressor Building	12.1	1,067,848.13	516,599.29	484.07
BUILDING 10	Compressor Building	12.1	1,067,833.70	516,620.28	483.63
BUILDING 10	Compressor Building	12.1	1,067,866.67	516,620.28	483.54
BUILDING 10	Compressor Building	12.1	1,067,858.03	516,632.85	483.07
BUILDING 11	Bridgeton Landfill Pump Shop 1	12.8	1,068,219.49	515,948.69	457.93
BUILDING 11	Bridgeton Landfill Pump Shop 1	12.8	1,068,188.98	515,930.15	458.29
BUILDING 11	Bridgeton Landfill Pump Shop 1	12.8	1,068,175.44	515,952.43	457.92
BUILDING 11	Bridgeton Landfill Pump Shop 1	12.8	1,068,185.96	515,958.82	457.84
BUILDING 11	Bridgeton Landfill Pump Shop 1	12.8	1,068,192.05	515,948.79	458.07
BUILDING 12	Bridgeton Landfill Pump Shop 2	12.8	1,068,144.27	515,924.87	458.18
BUILDING 12	Bridgeton Landfill Pump Shop 2	12.8	1,068,126.13	515,913.96	458.05
BUILDING 12	Bridgeton Landfill Pump Shop 2	12.8	1,068,109.89	515,940.95	457.87
BUILDING 12	Bridgeton Landfill Pump Shop 2	12.8	1,068,128.04	515,951.86	457.95
BUILDING 13	Treatment Plant	39.2	1,067,920.87	515,770.79	458.86
BUILDING 13	Treatment Plant	39.2	1,067,947.25	515,918.15	458.78
BUILDING 13	Treatment Plant	39.2	1,067,848.67	515,935.80	458.75
BUILDING 13	Treatment Plant	39.2	1,067,822.29	515,788.44	457.42
BUILDING 14	Nalco Storage Building	13.4	1,068,024.21	515,782.93	459.21
BUILDING 14	Nalco Storage Building	13.4	1,068,008.67	515,808.60	459.04
BUILDING 14	Nalco Storage Building	13.4	1,068,036.18	515,790.19	459.12
BUILDING 14	Nalco Storage Building	13.4	1,068,020.65	515,815.85	458.95
BUILDING 15	Electrical Control Building	13.4	1,067,922.41	515,658.15	458.77
BUILDING 15	Electrical Control Building	13.4	1,067,935.02	515,665.66	458.87
BUILDING 15	Electrical Control Building	13.4	1,067,906.87	515,684.23	458.54
BUILDING 15	Electrical Control Building	13.4	1,067,919.48	515,691.75	458.67
BUILDING 16	Cooling Tower	17.4	1,067,859.47	516,081.72	458.62
BUILDING 16	Cooling Tower	17.4	1,067,854.00	516,087.19	458.38
BUILDING 16	Cooling Tower	17.4	1,067,868.55	516,093.90	458.53
BUILDING 16	Cooling Tower	17.4	1,067,871.29	516,085.42	458.76
BUILDING 17	LCS 2 Building	7.2	1,066,741.11	516,423.99	493.91
BUILDING 17	LCS 2 Building	7.2	1,066,736.05	516,419.26	493.70
BUILDING 17	LCS 2 Building	7.2	1,066,742.64	516,412.19	494.58
BUILDING 17	LCS 2 Building	7.2	1,066,747.70	516,416.92	494.26
BUILDING 18	Bridgeton Landfill Southwest Storage 1	17.2	1,067,048.36	515,269.67	455.88
BUILDING 18	Bridgeton Landfill Southwest Storage 1	17.2	1,067,079.55	515,258.43	456.41
BUILDING 18	Bridgeton Landfill Southwest Storage 1	17.2	1,067,100.87	515,317.55	456.83
BUILDING 18	Bridgeton Landfill Southwest Storage 1	17.2	1,067,069.68	515,328.80	458.65
BUILDING 19	Bridgeton Landfill Southwest Storage 2	15.2	1,067,010.11	515,165.91	455.64
BUILDING 19	Bridgeton Landfill Southwest Storage 2	15.2	1,067,027.56	515,177.85	455.72
BUILDING 19	Bridgeton Landfill Southwest Storage 2	15.2	1,066,993.44	515,227.72	455.71
BUILDING 19	Bridgeton Landfill Southwest Storage 2	15.2	1,066,975.99	515,215.78	455.01
BUILDING 20	Storage Shed	6.0	1,068,491.72	515,842.17	459.35
BUILDING 20	Storage Shed	6.0	1,068,485.48	515,846.78	459.25
BUILDING 20	Storage Shed	6.0	1,068,491.35	515,854.73	459.26
BUILDING 20	Storage Shed	6.0	1,068,497.59	515,850.13	459.36
BUILDING 21	Pressure Wash Shed	10.3	1,068,519.61	515,754.88	461.03
BUILDING 21	Pressure Wash Shed	10.3	1,068,524.79	515,761.09	461.06
BUILDING 21	Pressure Wash Shed	10.3	1,068,517.99	515,766.76	460.94
BUILDING 21	Pressure Wash Shed	10.3	1,068,512.81	515,760.55	460.93
Tank 1	1M Gal. Tank	43.2	1,067,960.10	515,699.02	459.06
Tank 1	1M Gal. Tank	43.2	1,067,994.78	515,662.78	459.30
Tank 1	1M Gal. Tank	43.2	1,067,997.63	515,737.00	459.41
Tank 1	1M Gal. Tank	43.2	1,068,034.37	515,698.60	459.66
Tank 2	1M Gal. Tank	43.2	1,068,047.89	515,753.19	459.35
Tank 2	1M Gal. Tank	43.2	1,068,086.66	515,716.12	459.76
Tank 2	1M Gal. Tank	43.2	1,068,083.24	515,790.06	458.91
Tank 2	1M Gal. Tank	43.2	1,068,121.77	515,753.95	458.94
Tank 3	1M Gal. Tank	43.2	1,068,142.91	515,790.72	458.94
Tank 3	1M Gal. Tank	43.2	1,068,179.28	515,753.14	459.29
Tank 3	1M Gal. Tank	43.2	1,068,216.75	515,790.90	459.37
Tank 3	1M Gal. Tank	43.2	1,068,181.89	515,826.93	459.00
Tank 4	1M Gal. Tank	43.2	1,068,235.53	515,749.02	459.65
Tank 4	1M Gal. Tank	43.2	1,068,267.89	515,709.98	459.93
Tank 4	1M Gal. Tank	43.2	1,068,309.58	515,748.78	459.87
Tank 4	1M Gal. Tank	43.2	1,068,276.07	515,783.69	459.74
Tank 5	316K Gal. Tank	24.5	1,067,944.75	515,474.97	461.16
Tank 5	316K Gal. Tank	24.5	1,067,921.64	515,499.51	460.58
Tank 5	316K Gal. Tank	24.5	1,067,895.98	515,475.18	460.74
Tank 5	316K Gal. Tank	24.5	1,067,921.18	515,450.68	461.19
Tank 6	96K Gal. Tank	30.6	1,066,855.98	515,294.95	457.50
Tank 6	96K Gal. Tank	30.6	1,066,831.40	515,294.46	457.44
Tank 6	96K Gal. Tank	30.6	1,066,843.65	515,282.62	457.17
Tank 6	96K Gal. Tank	30.6	1,066,844.09	515,307.16	457.84
Asphalt Plant 1	Asphalt Plant Structure	22.5	1,068,322.92	515,469.32	461.62
Asphalt Plant 1	Asphalt Plant Structure	22.5	1,068,329.55	515,475.52	461.71
Asphalt Plant 1	Asphalt Plant Structure	22.5	1,068,335.40	515,469.96	461.65
Asphalt Plant 1	Asphalt Plant Structure	22.5	1,068,329.36	515,463.11	461.45
Asphalt Plant 2	Asphalt Plant Structure	36.4	1,068,308.33	515,475.24	461.26
Asphalt Plant 2	Asphalt Plant Structure	36.4	1,068,314.94	515,482.46	461.24
Asphalt Plant 2	Asphalt Plant Structure	36.4	1,068,320.81	515,475.52	461.51
Asphalt Plant 2	Asphalt Plant Structure	36.4	1,068,313.87	515,469.84	461.46
Asphalt Plant 3	Asphalt Plant Structure	14.9	1,068,344.38	515,397.88	461.40
Asphalt Plant 4	Asphalt Plant Structure	24.7	1,068,334.63	515,406.03	461.83
Asphalt Plant 5	Asphalt Plant Structure	26.9	1,068,316.92	515,387.21	462.09
Asphalt Plant 5	Asphalt Plant Structure	26.9	1,068,310.25	515,382.97	461.68
Asphalt Plant 5	Asphalt Plant Structure	26.9	1,068,306.41	515,387.81	461.77
Asphalt Plant 5	Asphalt Plant Structure	26.9	1,068,313.30	515,392.57	462.13
Asphalt Plant 6	Asphalt Plant Structure	24.4	1,068,304.33	515,407.04	462.40
Asphalt Plant 6	Asphalt Plant Structure	24.4	1,068,293.49	515,400.09	461.83
Asphalt Plant 7	Asphalt Plant Structure	39.5	1,068,256.88	515,402.16	460.93
Asphalt Plant 7	Asphalt Plant Structure	39.5	1,068,264.14	515,391.37	460.73
Asphalt Plant 7	Asphalt Plant Structure	39.5	1,068,331.14	515,434.87	461.95
Asphalt Plant 7	Asphalt Plant Structure	39.5	1,068,309.21	515,434.87	462.48
Asphalt Plant 7	Asphalt Plant Structure	39.5	1,068,288.28	515,421.79	462.29
Asphalt Plant 8	Asphalt Plant Structure	10.1	1,068,293.60	515,483.91	461.45
Asphalt Plant 8	Asphalt Plant Structure	10.1	1,068,298.89	515,476.22	461.25
Asphalt Plant 8	Asphalt Plant Structure	10.1	1,068,318.33	515,500.94	461.32
Asphalt Plant 8	Asphalt Plant Structure	10.1	1,068,323.63	515,493.25	461.24
Asphalt Plant 9	Asphalt Plant Structure	20.9	1,068,297.73	515,517.96	462.35
Asphalt Plant 10	Asphalt Plant Structure	11.2	1,068,208.11	515,440.96	463.37
Asphalt Plant 10	Asphalt Plant Structure	11.2	1,068,222.48	515,419.71	462.50
Asphalt Plant 10	Asphalt Plant Structure	11.2	1,068,243.88	515,434.19	461.65
Asphalt Plant 10	Asphalt Plant Structure	11.2	1,068,229.51	515,455.43	463.18
Asphalt Plant 11	Asphalt Plant Structure	9.0	1,068,205.50	515,418.76	462.62
Asphalt Plant 11	Asphalt Plant Structure	9.0	1,068,213.23	515,424.19	462.71
Asphalt Plant 11	Asphalt Plant Structure	9.0	1,068,218.78	515,416.30	462.45
Asphalt Plant 11	Asphalt Plant Structure	9.0	1,068,211.05	515,410.87	462.36

LEGEND

BASE TOPOGRAPHY (2' CONTOUR)

500 BASE TOPOGRAPHY (10' CONTOUR)

APPROXIMATE PARCEL(S) BOUNDARY CONTAINING BRIDGETON LANDFILL FACILITIES

VAPOR DESTRUCTION EQUIPMENT

0 100 200 Feet

NOTES:

- THIS DRAWING IS TO BE USED ONLY FOR ANALYSIS OF ITEMS LISTED IN THE DRAWING TABLES.
- ALL SITE INFRASTRUCTURE (APART FROM ITEMS LISTED IN THE DRAWING TABLES) ARE FOR VISUAL REFERENCE ONLY AND MAY NOT REFLECT CURRENT SITE CONDITIONS.
- AERIAL TOPOGRAPHY, IMAGERY AND FENCELINE WERE PROVIDED BY COOPER AERIAL SURVEYS CO. AND ARE DATED MARCH 20, 2014
- THE APPROXIMATE PARCEL(S) BOUNDARY CONTAINING BRIDGETON LANDFILL FACILITIES IS TAKEN FROM THE SHERBUT-CARSON-CLAXTON LLC DRAWING TITLED LANDFILL PARCEL REFERENCE MAP AND DATED 2/11/11. THIS BOUNDARY SHOULD NOT BE CONSIDERED FOR ANY USE OUTSIDE OF THIS DRAWING. IT SHOULD BE UTILIZED AS APPROXIMATE REFERENCE IN THIS DRAWING ONLY.

BRIDGETON LANDFILL LLC.
13570 ST. CHARLES ROCK ROAD
BRIDGETON, MISSOURI 63044

BRIDGETON LANDFILL
AIR ANALYSIS

BRIDGETON LANDFILL AIR ANALYSIS
SITE INFORMATION

Engineering for a Better World
FEEZOR ENGINEERING, INC.

MARCH 2015
PML
APPROVED BY: ---

REVISION	DATE

DRAWING NO.: **001**

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