Jaricus Whitlock

From:	Mcilwain, Annie <annie.mcilwain@ppmco.com>
Sent:	Thursday, January 11, 2024 10:48 AM
To:	Jaricus Whitlock
Cc:	Wayne Kooy; Josh Jones; Hansen, Paul; Plummer, Rick; Laura James; Rodney Cuevas; Ivelina Pilgrim
Subject:	RE: ABE Air Toxics Model Report
Attachments:	Amite BioEnergy - Air Toxics Report v2.0.pdf

Jaricus,

Please find attached the modeling report for ABE with edited formatting.

Thanks,

Annie McIlwain, P.E. (MS)
Principal/District Manager
PPM Consultants, Inc.
289 Commerce Park Drive, Suite D
Ridgeland, MS 39157
p: 601-956-8233
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annie.mcilwain@ppmco.com
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From: Jaricus Whitlock <jwhitlock@mdeq.ms.gov>
Sent: Wednesday, January 10, 2024 9:46 AM
To: Mcilwain, Annie <annie.mcilwain@ppmco.com>
Cc: Wayne Kooy <Wayne.Kooy@drax.com>; Josh Jones <Josh.Jones@drax.com>; Hansen, Paul <Paul.Hansen@ppmco.com>; Plummer, Rick <rick.plummer@PPMCo.com>; Laura James <LJAMES@mdeq.ms.gov>; Rodney Cuevas <RCuevas@mdeq.ms.gov>; Ivelina Pilgrim <IPilgrim@mdeq.ms.gov>
Subject: RE: ABE Air Toxics Model Report

Hello Annie,

It was just brought to my attention that the submitted air toxics report does not contain Table 3-1 (located on page 7). As such, I ask that you please provide an amended report.

If you have any questions or concerns, please do not hesitate to contact me.

Best Regards,

Jaricus Whitlock, P.E.
Chief, Air Division
Office of Pollution Control
Mississippi Dept. of Environmental Quality
P.O. Box 2261
Jackson, MS 39225

Office: (601) 961-5303

From: Mcilwain, Annie <annie.mcilwain@ppmco.com>
Sent: Tuesday, January 9, 2024 3:23 PM
To: Jaricus Whitlock <jwhitlock@mdeq.ms.gov>; Kenny Pilgrim <KPILGRIM@mdeq.ms.gov>
Cc: Wayne Kooy <Wayne.Kooy@drax.com>; Josh Jones <Josh.Jones@drax.com>; Hansen, Paul <Paul.Hansen@ppmco.com>; Plummer, Rick <rick.plummer@PPMCo.com>
Subject: Fwd: ABE Air Toxics Model Report

Good afternoon,

Please find attached the Air Toxics Modeling Report for Amite BioEnergy. A hard copy of the attached was also mailed to you today.

Thanks,

Annie McIlwain, P.E. (MS)
Principal/District Manager
PPM Consultants, Inc.
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From: Hansen, Paul <Paul.Hansen@ppmco.com>
Sent: Monday, January 8, 2024 5:39:01 PM
To: Mcilwain, Annie <annie.mcilwain@ppmco.com>
Cc: Josh Jones <Josh.Jones@drax.com>; Wayne Kooy <Wayne.Kooy@drax.com>
Subject: ABE Air Toxics Model Report

Annie,

Attached is the Air Toxics report for ABE. I will have a hard copy mailed tomorrow.

Thanks

Paul D. Hansen, P.E.
Project Manager
PPM Consultants, Inc.
5555 Bankhead Highway
Birmingham, AL 35210
p: 205-836-5650
m: 256-239-2526

AIR TOXICS MODELING REPORT

AMITE BIOENERGY, LLC
1763 GEORGIA PACIFIC ROAD NO. 2
GLOSTER, MISSISSIPPI

PPM PROJECT NO. 30065126

JANUARY 2024

PPM CONSULTANTS

TABLE OF CONTENTS

REPORT FIGURES

REPORT TABLES

FIGURES (APPENDIX A)

APPENDICES

1.0 INTRODUCTION

Amite BioEnergy LLC (ABE) is a wood pellets production facility located in Gloster, Mississippi. The facility is classified as a major source of Hazardous Air Pollutants (HAP). Due to the facility's classification as a HAP major source, the facility is subject to 40 CFR Part 63, Subpart B. ABE was required to perform a Maximum Achievable Control Technology (MACT) case-by-case analysis (Analysis) in accordance with the Clean Air Act (CAA) Section 112(g).

The Mississippi Department of Environmental Quality (MDEQ) is requiring ABE to conduct an impact analysis on air toxics emitted from overall operations in order to demonstrate the facility's emissions of air toxics are at such rates to not adversely affect human health in accordance with Mississippi Administrative Code, Title 11, Part 2, Chapter 2, Rule 2.5.A.(3)(a)-(b). A table showing facility emissions is included in **Appendix B – Source Parameters.**

An air quality dispersion modeling protocol (previously submitted to MDEQ on November 13, 2023), which describes the proposed methodology to be followed in conducting the air dispersion analyses required to demonstrate compliance with the air toxic standards for the facility was approved by MDEQ in November 2023. The methodology described in the protocol is utilized in this final modeling report to demonstrate compliance with applicable standards. The protocol was prepared in accordance with the current U.S. Environmental Protection Agency (U.S. EPA)[1] and the Alabama Department of Environmental Management (ADEM)[2] modeling guidelines.

Section 2.0, Air Quality Dispersion Modeling Methodology, explains the modeling methodology, which includes a discussion of the Air Toxics Screening Analysis. **Section 2.0** also describes the model selection and inputs, which includes a discussion of the meteorological data, land use and topography, Good Engineering Practice (GEP) Stack Height Analysis, building wake effects, receptor grid, source parameters, and additional impacts analysis. **Section 3.0, Air Toxics Screening Analysis** provides the results of the air dispersion modeling analysis.

[1] EPA's *Guideline on Air Quality Models (Revised)*, Federal Register Vol. 70, No. 216, pp. 68,218 - 68,261, November 9, 2005. Codified at 40 CFR Part 51, Appendix W and EPA's *New Source Review Workshop Manual (DRAFT)* (1990).
[2] *PSD Air Quality Analysis Modeling Guidelines*, Air Division, Planning Branch ADEM, September 2020.

Appendix A, Figures, includes a site location map of the project area (**Figure 1, Site Location Map; Figure 2, Land Use Map**).

2.0 AIR QUALITY DISPERSION MODELING METHODOLOGY

The purpose of the air quality analysis is to demonstrate that the largest air toxic contributors (Acetaldehyde, Formaldehyde, Methanol, and Phenol) emitted from ABE will not cause adverse effects on human health. As discussed in detail in the following sections, the air dispersion modeling analysis was conducted in accordance with the U.S. Environmental Protection Agency (U.S. EPA)[3] and the ADEM[4] modeling guidelines and other appropriate guidance.

2.1 SUMMARY

The tasks that are performed in a standard consist of evaluating potential sources, defining the facility boundaries, developing the model inputs (sources, buildings, tanks, etc.), processing terrain data and meteorological data, and determining the appropriate averaging periods. The model is then run to produce the ground-level concentrations. The modeled ground-level concentrations are compared to the corresponding time-weighted average (TWA), or Acceptable Ambient Concentrations (AAC), to determine if any predicted concentrations at any receptor locations are “significant”.

If the significance analysis reveals that modeled ground-level concentrations (GLC) for a particular pollutant and averaging period are greater than the applicable TWA, further analysis is required based on acceptable emission rates. If predicted significance analysis impacts for a particular pollutant are below the applicable TWA(s), then no further analyses are required for that pollutant. Each analysis that was conducted is discussed in detail on the following pages.

Table 2-1 – Ambient Concentrations, lists the applicable standards for the pollutants involved with the dispersion model.

[3] EPA's *Guideline on Air Quality Models (Revised)*, Federal Register Vol. 70, No. 216, pp. 68,218 - 68,261, November 9, 2005. Codified at 40 CFR Part 51, Appendix W and EPA's *New Source Review Workshop Manual (DRAFT)* (1990).

[4] *PSD Air Quality Analysis Modeling Guidelines*, Air Division, Planning Branch ADEM, September 2020.

Table 2-1 – Acceptable Ambient Concentrations (OSHA)

Pollutant	Averaging Period	PEL-TWA (ppm)	PEL-C (ppm)
Methanol	8-hr	200	1000
Formaldehyde	8-hr	0.75	-
Phenol	8-hr	5	-
Acetaldehyde	8-hr	200	25

2.2 DISPERSION MODEL SELECTION

The American Meteorological Society / Environmental Protection Agency Regulatory Model (AERMOD) is the Guideline-recommended model for evaluating near-field impacts (i.e., source receptor distances of less than 50 km). The AERMOD modeling system is composed of three modular components: AERMAP, the terrain preprocessor; AERMET, the meteorological preprocessor; and AERMOD, the control module and modeling processor. Additionally, a fourth processor, the AERSURFACE tool, is used to estimate surface characteristics required for input to AERMET. The most recent versions of each processor were used: for AERMOD, version 23132; for AERMET, version 23132; for AERMAP, version 18081; and for AERSURFACE, version 20060. All AERMOD dispersion modeling was performed using the regulatory default options.

2.3 METEOROLOGICAL DATA

The EPA AERMOD program requires meteorological data preprocessed with the AERMET program. Three additional variables are considered when preprocessing the surface and meteorological data for a site. These variables are surface roughness, Albedo; and Bowen Ratio. MDEQ provided AERSURFACE data associated with meteorological data. Meteorological data is originally sourced from the National Weather Service (NWS). Data used included the years 2018 through 2022.

2.4 LAND USE

ABE is located in Gloster, Mississippi. An Auer Land Use analysis[5] for a 3-kilometer radius surrounding the facility is required to demonstrate the appropriate dispersion regime (urban/rural) for the area. The land within a 3-kilometer radius of the facility is predominately rural; therefore, no urban options were selected for the modeling. An area map demonstrating the 3-kilometer area surrounding ABE is presented in **Figure 2 – Land Use Map** of **Appendix A.**

2.5 TOPOGRAPHY

The terrain elevation for each modeled building, source, and receptor was determined using USGS National Elevation Data set (NED). The terrain height for each modeled receptor was calculated using AERMAP (version 18081), a terrain preprocessor developed specifically for the AERMOD model. AERMAP computes the terrain height and hill height scale from the digital terrain elevations surrounding the modeled receptors. AERMAP also computes the terrain height for modeled sources and buildings. AERMAP is used to search for the terrain height and location that has the greatest influence on dispersion for an individual receptor. ABE used 1/3 arc second terrain data files for the dispersion modeling.

2.6 FENCELINE

ABE was approved to use the property boundaries to designate the "fenceline" for the purpose of defining where the "ambient air" will begin with regard to the model.

2.7 GOOD ENGINEERING PRACTICE (GEP) STACK HEIGHT

A good engineering practice (GEP) stack height evaluation determines if avoidance of building wake effects allow a point source to be modeled at a height greater than 65 meters. The GEP formula stack height is expressed as the greater of 65 meters or GEP = Hb + 1.5L (where Hb is the building height, and L is the lesser of the building's height or maximum projected width). These procedures follow EPA Guidelines for Determination of Good Engineering Practice Stack Height.[6]

[5] Auer, Jr., A.H., 1978. "Correlation of Land Use and Cover with Meteorological Anomalies." Journal of Applied Meteorology, 17:636-643.
[6] EPA, Guideline for Determination of Good Stack Height (Technical Support Document for the Stack Height Regulations) (Revised), 1985.

All proposed stacks at the facility are less than 65 meters in height. ABE modeled each emission source at its proposed stack height to demonstrate compliance. Therefore, a GEP stack height analysis was not required.

2.8 BUILDING WAKE (DOWNWASH) EFFECTS

The emissions sources for the proposed project were evaluated in terms of their proximity to nearby structures. The purpose of this evaluation was to determine if stack discharges may become caught in the turbulent wakes generated by these structures. AERMOD incorporates the Plume Rise Model Enhancements (PRIME) algorithms for estimating enhanced plume growth and restricted plume rise for plumes affected by building wakes.[7]

Direction-specific structure dimensions and the dominant downwash structure parameters used as input to AERMOD were determined using the Building Profile Input Program - PRIME Model (BPIPPRM) software version 04274.

The output from the BPIPPRM downwash analysis listed the names and dimensions of the structures generating wake effects and the locations and heights of the affected emissions sources (i.e., stacks). In addition, the output contained a summary of the dominant structure for each emissions source (considering all wind directions) and the actual structure height and projected widths for all wind directions. This information was incorporated into the AERMOD data input files.

2.9 RECEPTOR GRID

The receptor grids used in the preliminary modeling analysis followed the written guidelines provided by ADEM in their Air Quality Modeling Procedures (AQMP). For the modeling analysis, ABE utilized a Cartesian receptor grid to locate off-property, ground-level concentrations. The receptor grid extended from the property boundary outward to 10,000 meters (or 10 kilometers). ABE ensured the appropriate terrain features were captured and that concentrations were decreasing at the edge of the grid. All high values were located well within the receptor grid, therefore, no extension to the initial grid was necessary.

Receptor spacing varied according to distance from the facility. ABE placed receptors at 100-meter intervals along the property boundary. ABE also placed

[7] L.L. Schulman, D.G. Strimaitis, and J.S. Scire, Development and Evaluation of the Prime Plume Rise and Building Downwash Model, *AWMA*, 50:378-390, 2000.

100-meter spaced receptors along any public roads, railroads, or navigable waterways that bisect the property. From the property line to 4,000 meters (4 kilometers), ABE placed receptors every 100 meters. From 4 kilometers to 7 kilometers from the property boundary, ABE placed receptors every 250 meters. From 7 kilometers to 10 kilometers from the property boundary, ABE placed receptors every 500 meters. Receptors that were required beyond 10 kilometers were placed with spacing of 500 meters. If the maximum concentration from the significance analysis was located in an area where the receptor spacing was greater than 100 meters, or located at the edge of a grid, a refined receptor grid (100 meter spacing) was placed around the location to ensure that the maximum concentration was accurately located.

2.10 EMISSION RATES

The modeled emission rates for the Air Toxics Analysis are the Potential to Emit (PTE) emissions.

2.11 SOURCE PARAMETERS

MDEQ requires a table to be submitted identifying all baseline and increment sources used in the modeling (onsite and offsite), including all applicable stack, area, and volume source parameters. These tables are provided in **Appendix B**.

3.0 AIR TOXICS SCREENING ANALYSIS

MDEQ has required ABE to perform an Air Toxics analysis to provide data supporting there are no adverse effects to human health. The screening analysis consisted of four separate 8-hr models for each year beginning in 2018 and ending in 2022.

3.1 TOXICS ANALYSIS

The significance analysis compares the maximum concentration from the significance model to the appropriate **Table 2-1 – Acceptable Ambient Concentrations**. If the maximum concentration for a pollutant is less than its respective acceptable ambient concentration, the project's impact is not significant; therefore, no further analysis is required. If the maximum concentration for a pollutant is greater than or equal to its respective acceptable ambient concentration, the project's impact is potentially significant and further analysis is required. No modeled pollutant exceeded the acceptable ambient concentration.

Significance modeling was performed for Acetaldehyde, Formaldehyde, Methanol, and Phenol. The results of the modeling were compared with the applicable significance levels to determine whether additional modeling is necessary.

3.1.1 Acetaldehyde Analysis Impacts

In this analysis, the Acetaldehyde associated with the facility is modeled for comparison to the OSHA TWA guidelines, which are defined for the 8-hour averaging periods. The numerical results of the analysis are displayed in the following table.

Table 3-1 – Acetaldehyde Analysis Impacts

Meteorological Data Year	Averaging Period	UTM East (m)	UTM North (m)	Modeled Concentration (µg/m^3)	TWA (µg/m^3)
2018	8-hour	687100.00	3451800.00	2.105	500
2019	8-hour	687544.67	3451461.22	2.161	
2020	8-hour	687174.09	3451728.38	1.972	
2021	8-hour	687544.67	3451379.23	2.351	
2022	8-hour	687174.09	3451728.38	2.366	
5-Year Max	**8-hour**	687174.09	3451728.38	**2.366**	**500**

Based on the results presented in the above table, the Acetaldehyde maximum offsite impacts from the proposed project do not exceed, and in fact are significantly below, the TWA for the 8-hour averaging period. As such, no further modeling was required for Acetaldehyde. Figures on the following pages display the receptor grids and maximum concentration contours for the Acetaldehyde 8-hour model.

Figure 3-1 –Receptor Grid (All Pollutants)

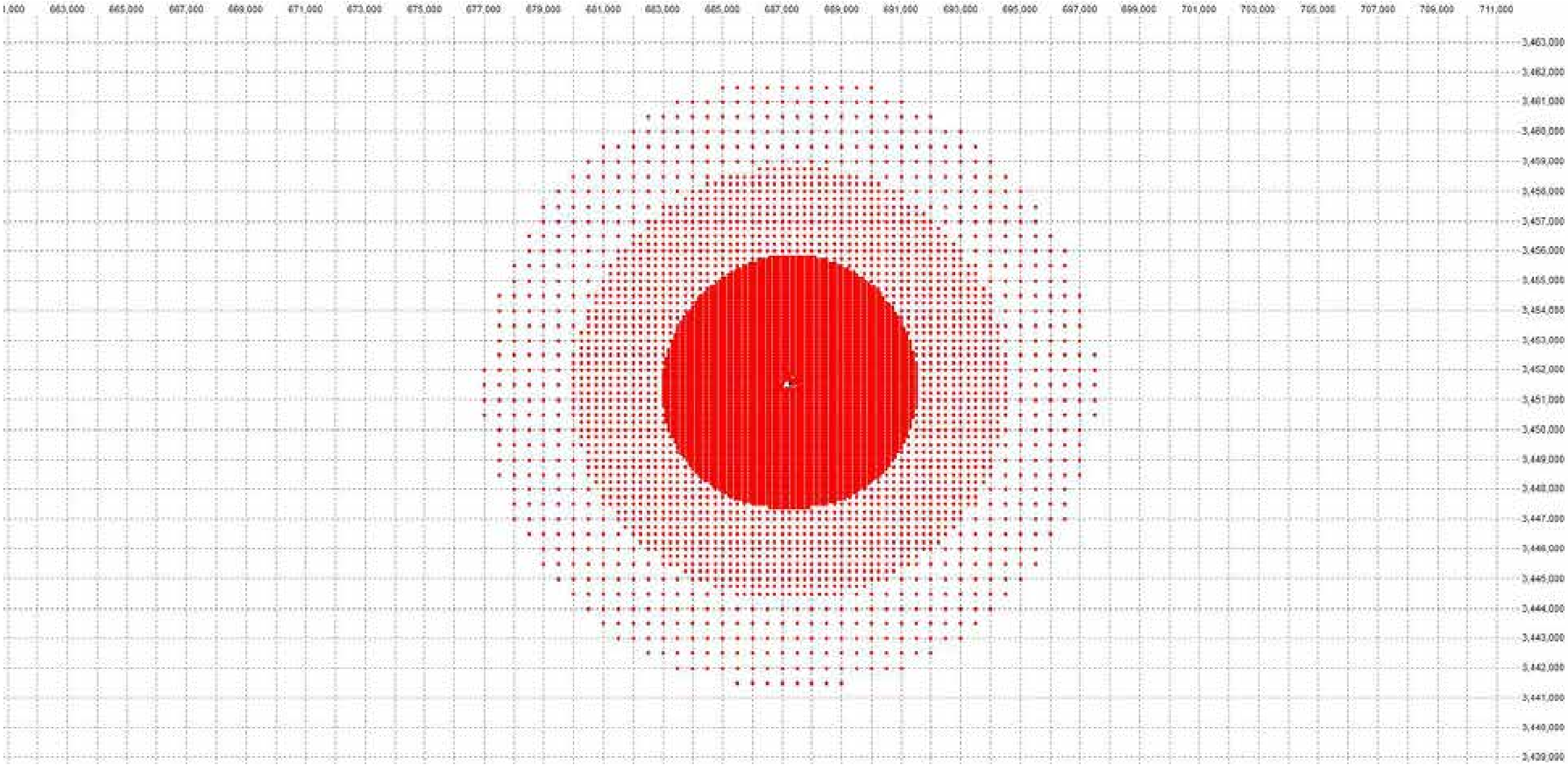
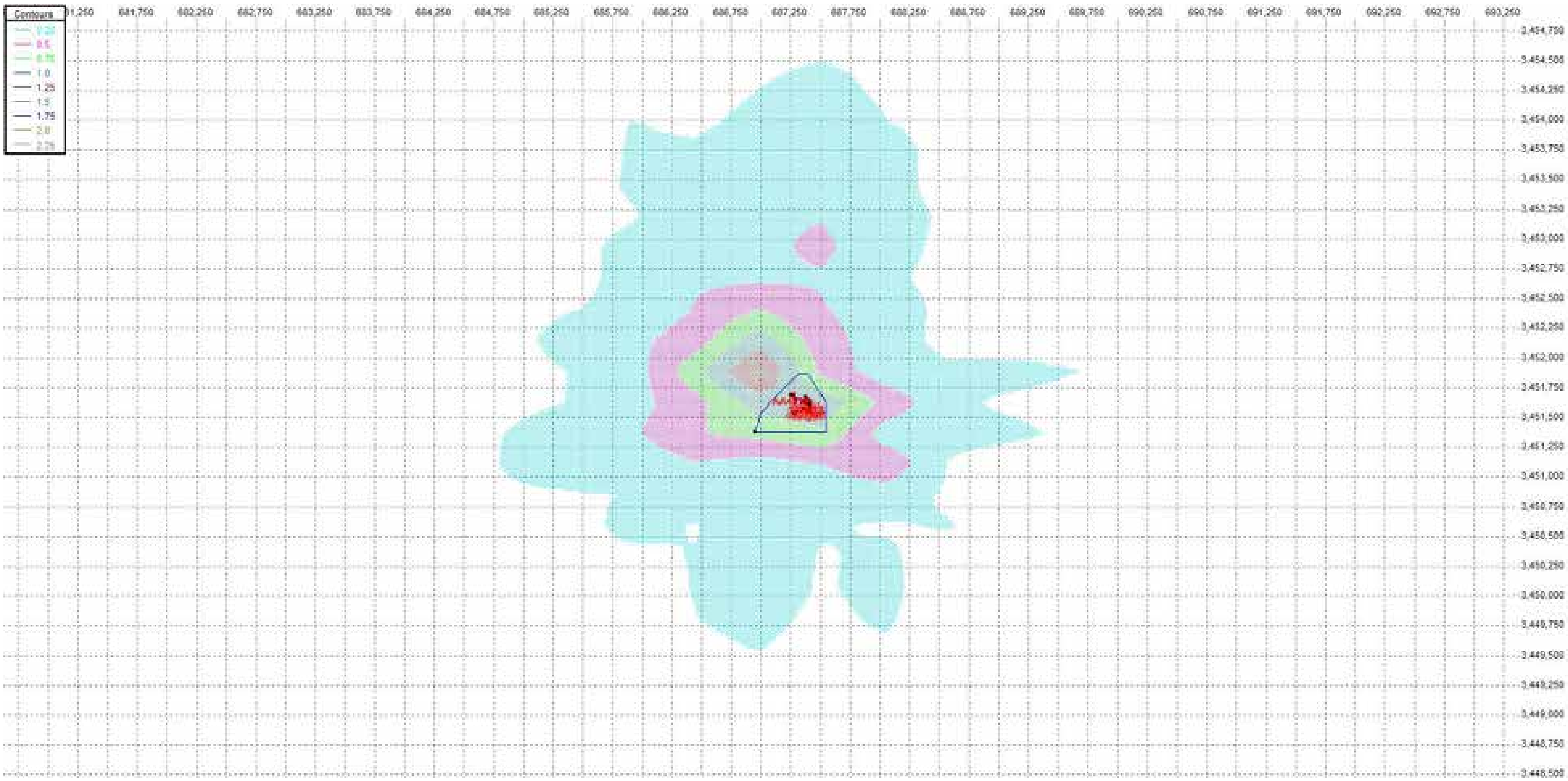


Figure 3-2 – Acetaldehyde 8-hour Contours (No Exceeding Receptors)



3.1.2 Formaldehyde Analysis Impacts

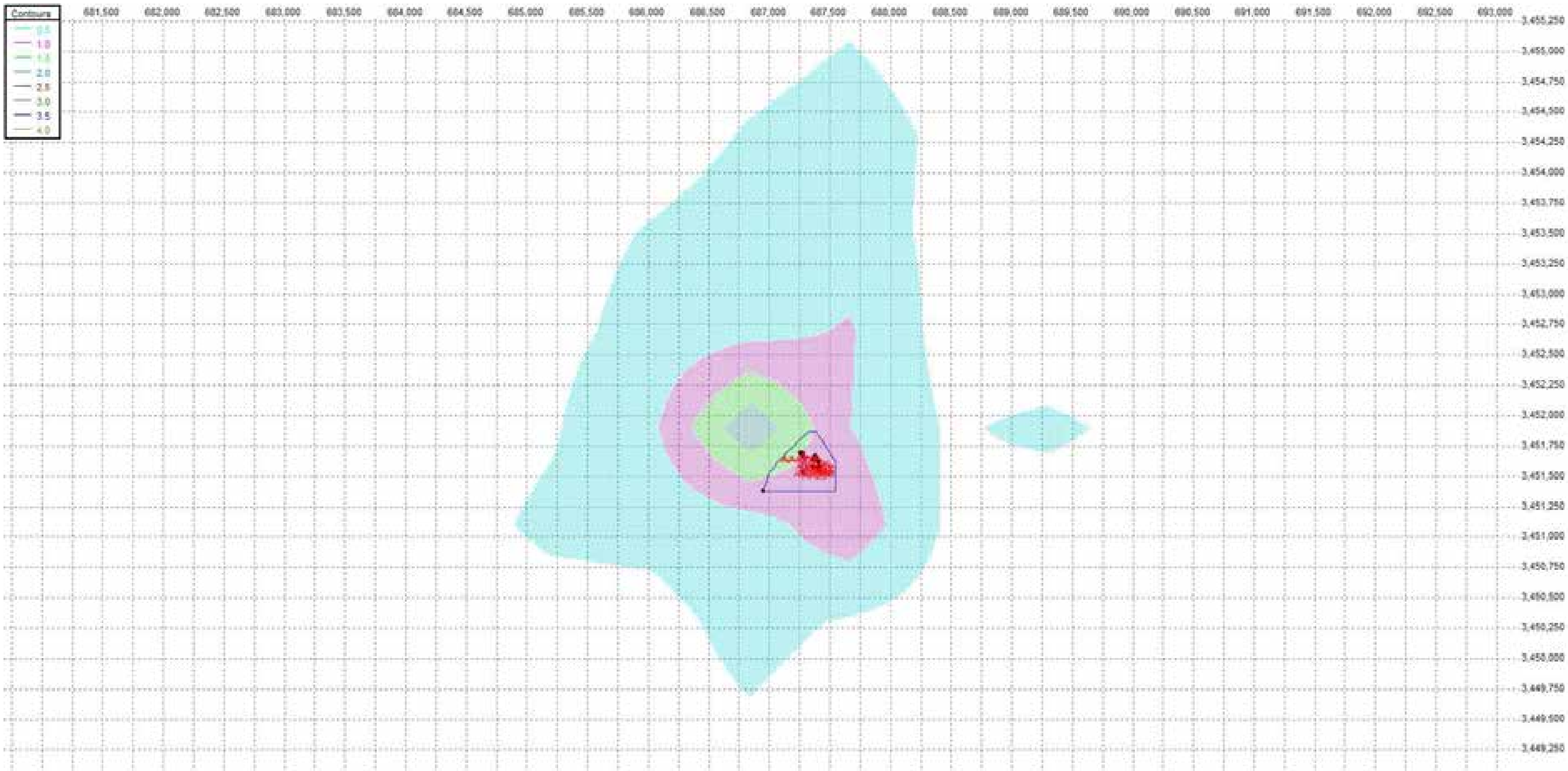
In this analysis, the potential Formaldehyde emissions from the facility are modeled for comparison to the OSHA TWA Guidelines, which are defined for the 8-hour averaging period. The following table summarizes the numerical results of the modeling analysis.

Table 3-2 – Formaldehyde Analysis Impacts

Meteorological Data Year	Averaging Period	UTM East (m)	UTM North (m)	Modeled Concentration (µg/m3)	TWA (µg/m3)
2018	8-hour	687100.00	3451800.00	3.738	**750**
2019	8-hour	687544.67	3451461.22	4.019	
2020	8-hour	687174.09	3451728.38	3.681	
2021	8-hour	687544.67	3451379.23	4.264	
2022	8-hour	687174.09	3451728.38	4.433	
5-Year Max	**8-hour**	687174.09	3451728.38	**4.433**	**750**

Based on the results presented in the above table, the Formaldehyde maximum offsite impacts from the proposed project do not exceed, and in fact are significantly below, the TWA for the 8-hour averaging period. As such, no further modeling was required for Formaldehyde. Figures on the following pages display the receptor grids and maximum concentration contours for the Formaldehyde 8-hour model.

Figure 3-3 – Formaldehyde 8-hour Contours (No Exceeding Receptors)



3.1.3 Methanol Analysis Impacts

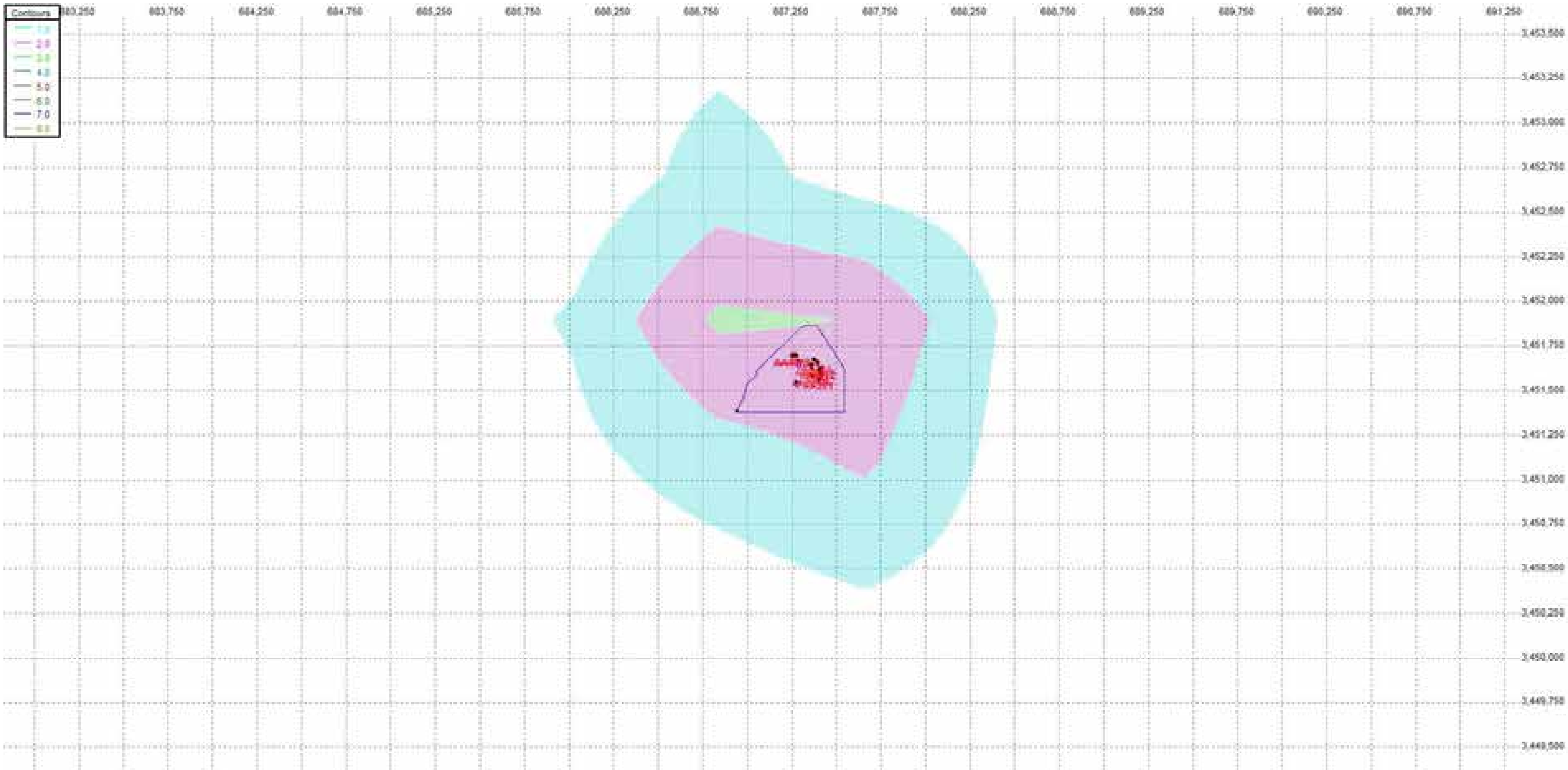
In this analysis, the potential Methanol emissions from the facility are modeled for comparison to the OSHA TWA Guidelines, which are defined for the 8-hour averaging period. The following table summarizes the numerical results of the modeling analysis.

Table 3-3 – Methanol Analysis Impacts

Meteorological Data Year	Averaging Period	UTM East (m)	UTM North (m)	Modeled Concentration (µg/m3)	TWA (µg/m3)
2018	8-hour	687300.00	3451853.41	8.667	**200,000**
2019	8-hour	687300.00	3451853.41	8.626	
2020	8-hour	687300.00	3451853.41	8.059	
2021	8-hour	687300.00	3451853.41	8.102	
2022	8-hour	687300.00	3451853.41	8.211	
5-Year Max	**8-hour**	687300.00	3451853.41	**8.667**	**200,000**

Based on the results presented in the above table, the Methanol maximum offsite impacts from the proposed project do not exceed, and in fact are significantly below, the TWA for the 8-hour averaging period. As such, no further modeling was required for Methanol. Figures on the following pages display the receptor grids and maximum concentration contours for the Methanol 8-hour model.

Figure 3-4 – Methanol 8-hour Contours (No Exceeding Receptors)



3.1.4 Phenol Analysis Impacts

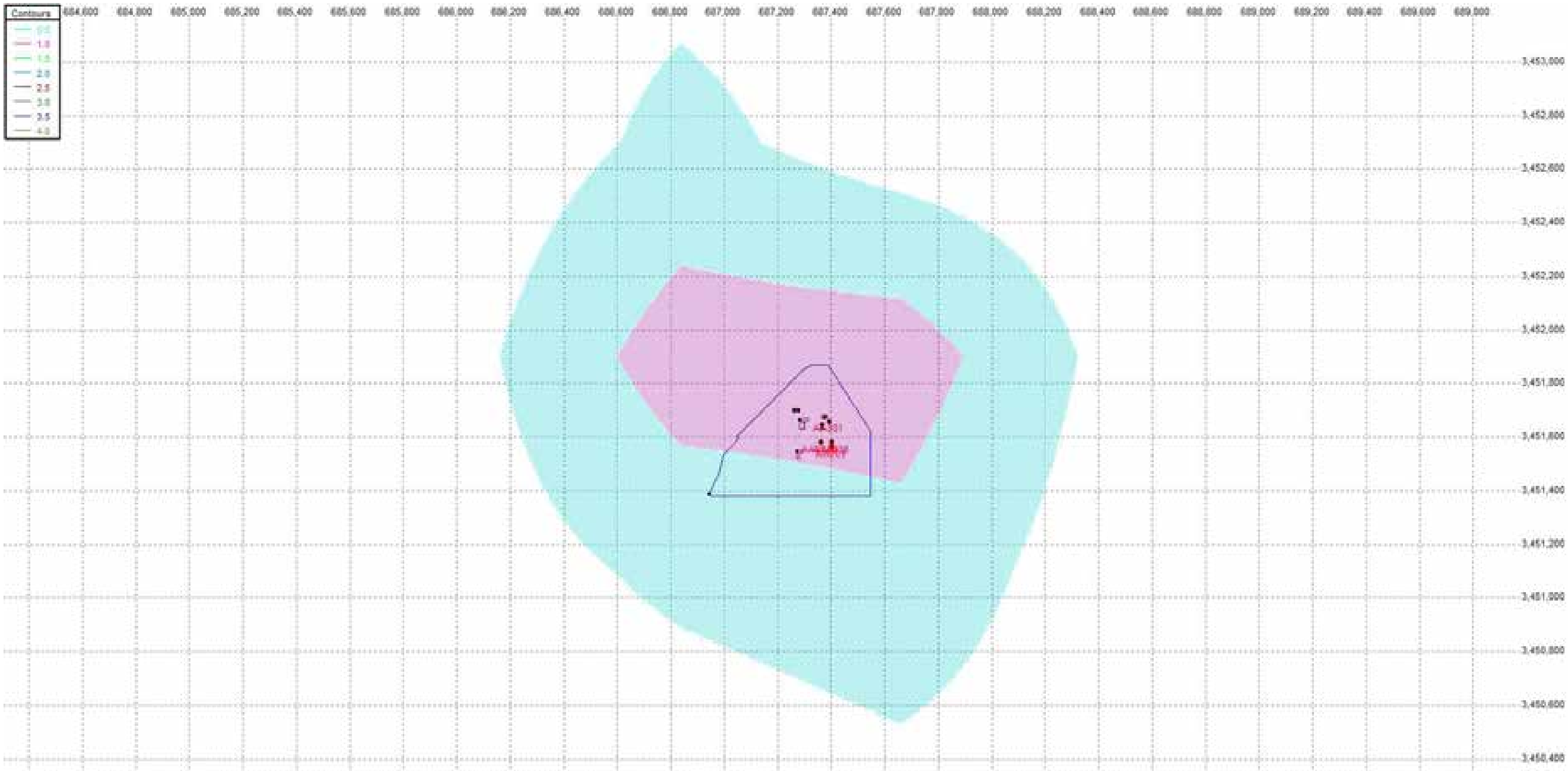
In this analysis, the potential Phenol emissions from the facility are modeled for comparison to the OSHA TWA Guidelines, which are defined for the 8-hour averaging period. The following table summarizes the numerical results of the modeling analysis.

Table 3-4 – Phenol Analysis Impacts

Meteorological Data Year	Averaging Period	UTM East (m)	UTM North (m)	Modeled Concentration (µg/m3)	TWA (µg/m3)
2018	8-hour	687300.00	3451853.41	4.329	**5000**
2019	8-hour	687300.00	3451853.41	4.180	
2020	8-hour	687300.00	3451853.41	4.006	
2021	8-hour	687300.00	3451853.41	3.928	
2022	8-hour	687300.00	3451853.41	4.100	
5-Year Max	**8-hour**	687300.00	3451853.41	**4.329**	**5000**

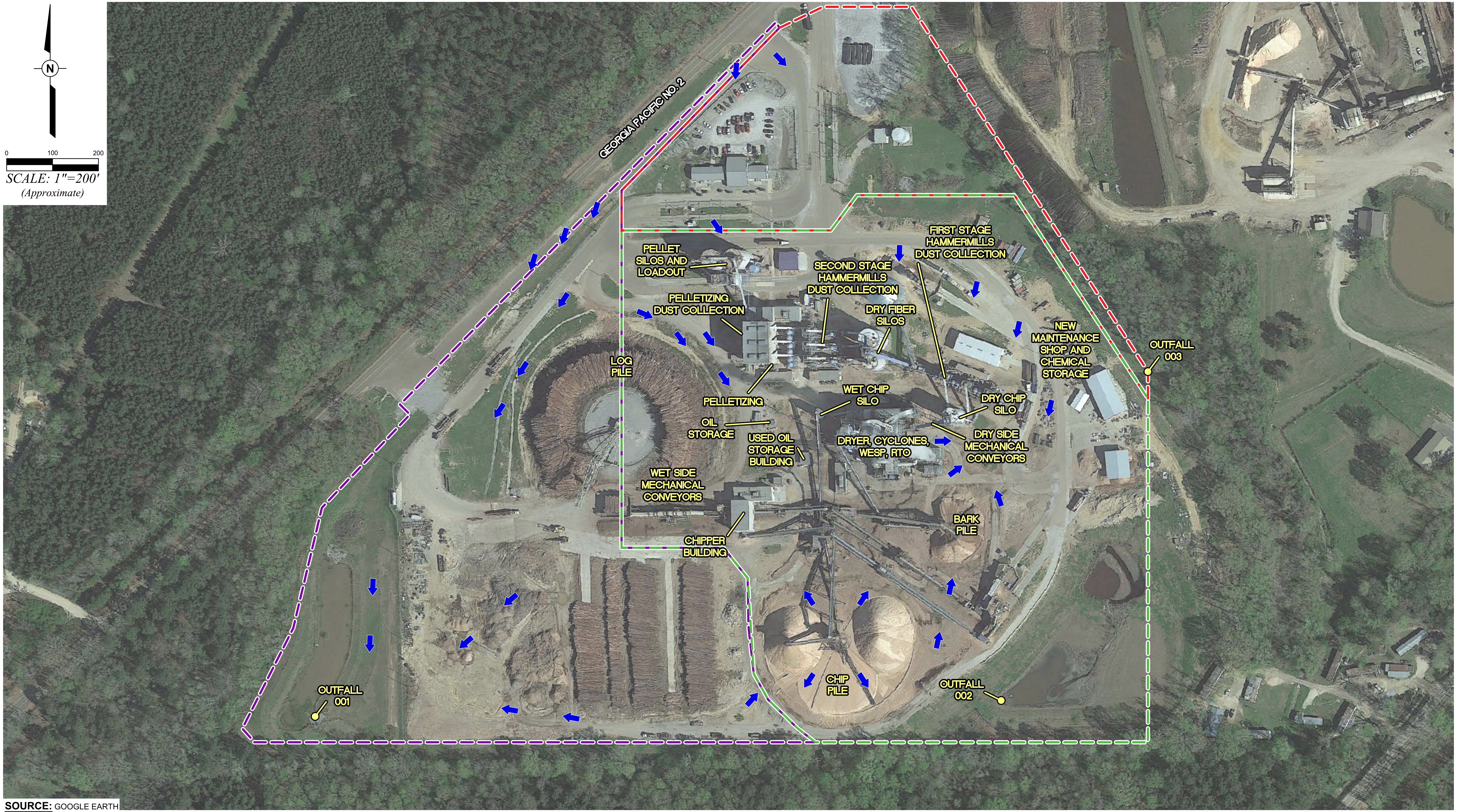
Based on the results presented in the above table, the Phenol maximum offsite impacts from the proposed project do not exceed, and in fact are significantly below, the TWA for the 8-hour averaging period. As such, no further modeling was required for Phenol. Figures on the following pages display the receptor grids and maximum concentration contours for the Phenol 8-hour model.

Figure 3-5 – Phenol 8-hour Contours (No Exceeding Receptors)

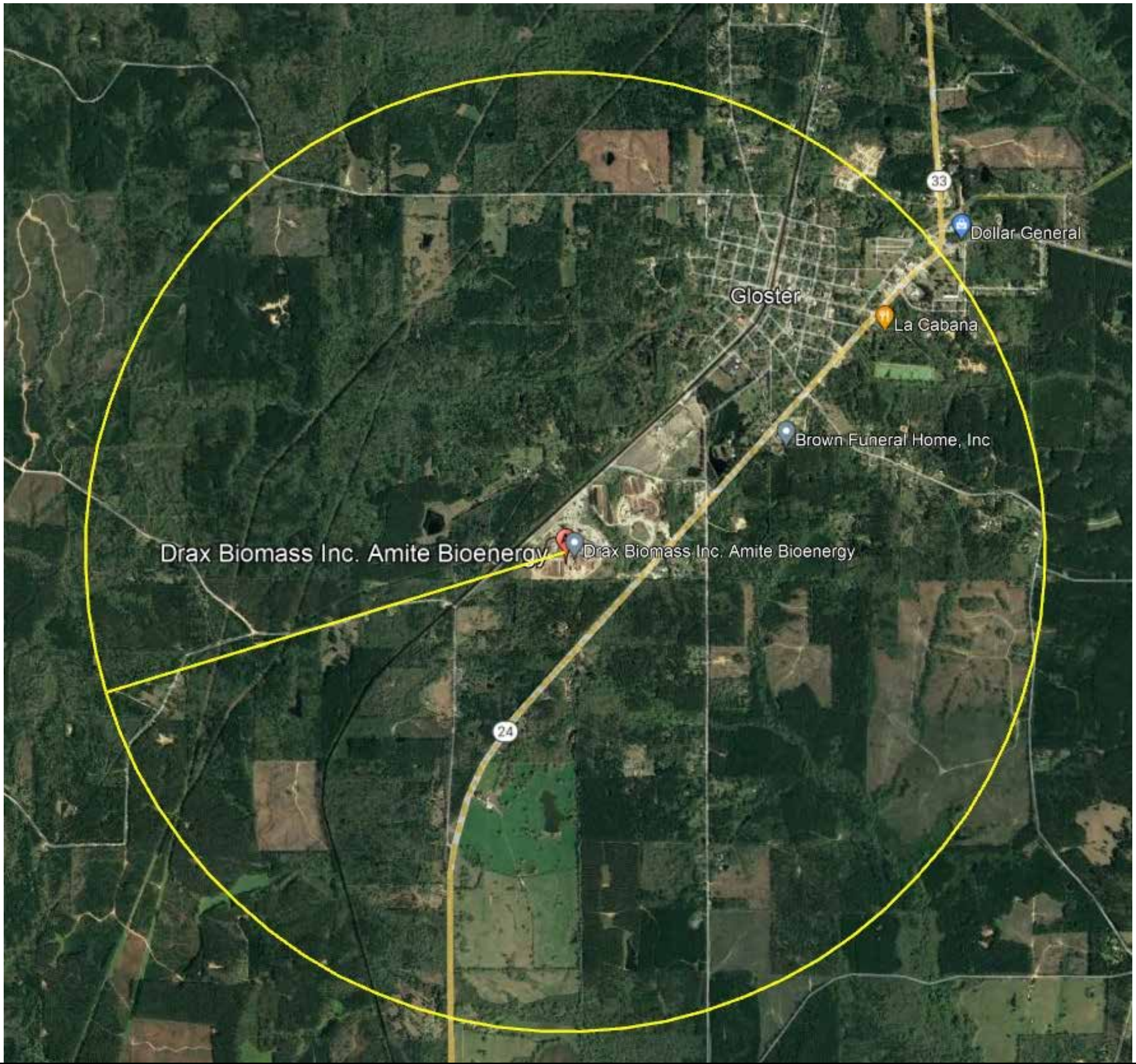


APPENDICES

APPENDIX A – FIGURES



PPM CONSULTANTS, INC. www.ppmco.com		DRAX BIOMASS, INC. **AMITE BIOENERGY, LLC** 1763 GEORGIA PACIFIC ROAD NO. 2 GLOSTER, MISSISSIPPI	SITE MAP (MAIN SITE)	FIGURE NUMBER 1
DRAWN BY: BWH	DRAWN DATE: 11/13/223			
PROJECT NUMBER: 30065104	PHASE: -			



PPM CONSULTANTS, INC.
www.ppmco.com

DRAWN BY: PDH

DRAWN DATE: 11/13/23

PROJECT NUMBER: 30065126

Amite BioEnergy
Gloster Facility
1763 Georgia Pacific Road No. 2
Gloster, Mississippi

LAND USE MAP

FIGURE NUMBER 2

APPENDIX B – SOURCE PARAMETERS

EQT	Description	Release Type	Stack Flow Rate (acfm)	Stack Diameter (ft)	Stack Height (ft)	Stack Temp. (°F)	Stack Velocity (ft/sec)	UTM Easting	UTM Northing	Acetaldehyde (TPY)	Formaldehyde (TPY)	Methanol (TPY)	Phenol (TPY)
AA-201	WESP and RTO with Natural Gas Burner	Vertical	202,067	8.00	50.00	170.0	67.00	687,404	3,451,566	1.542	3.855	6.916	2.991
AA-203b	Furnace By-Pass Start/Stop	Vertical	202,067	8.00	50.00	170.0	67.00	687,345	3,451,582	0.001	0.004	0.00E+00	4.25E-05
AA-203c	Furnace By-Pass Idle	Vertical	202,067	8.00	50.00	170.0	67.00	687,345	3,451,582	0.003	0.018	0.00E+00	2.11E-04
AA-204b	Dryer By-pass Start/Stop	Vertical	202,067	8.00	50.00	170.0	67.00	687,362	3,451,583	0.043	0.081	0.064	0.016
AA-301	Regenerative Catalytic Oxidizer	Vertical	293,042	10.67	60.00	134.0	54.62	687,393	3,451,662	1.156	1.093	12.806	6.934
AA-302	Primary Hammermill Feed Silo	Vertical	1,500	1.50	65.00	77.0	14	687,413	3,451,595	0.344	0.656	0.344	0.00E+00
AA-305	Secondary Hammermill Feed Silo 1, Bin Vent	Vertical	1,500	1.50	65.00	77.0	14.15	687,359	3,451,632	0.312	0.593	0.312	0.00E+00
AA-306	Secondary Hammermill Feed Silo 2, Bin Vent	Vertical	1,500	1.50	65.00	77.0	14.15	687,358	3,451,646	0.161	0.303	0.161	0.00E+00
AA-401A	Pellet Storage Silo 1, Bin Vent	Vertical	300	1.30	60.00	77.0	3.77	687,270	3,451,699	0.244	0.469	0.244	0.00E+00
AA-401B	Pellet Storage Silo 2, Bin Vent	Vertical	300	1.30	60.00	77.0	3.77	687,254	3,451,699	3.90E-05	7.50E-05	3.90E-05	0.00E+00
AA-401C	Sceened Materials Return System	Vertical	7,452	1.50	36.00	77.0	70.28	687,401	3,451,623	8.00E-05	1.50E-04	8.00E-05	0.00E+00
AA-401D	Pellet Loading System Pneumatic System Filter	Vertical	23,555	7.90	10.00	77.0	8.01	687,288	3,451,699	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AA-501	Fire Pump Engine	Vertical	1,402	0.50	10.00	967.0	119.00	687,368	3,451,781	0.00E+00	0.00E+00	0.00E+00	0.00E+00
AA-502	Emergency Generator	Vertical	5,054	0.50	10.00	1020.0	429.00	687,346	3,451,556	0.00E+00	0.00E+00	0.00E+00	0.00E+00