



Air Impact Modeling Analyses Report Form

1.0 Summary

Tesoro Logistics Operations, LLC (TLO) operates a refined petroleum products terminal near Pocatello, ID (the terminal; facility ID number 077-00023). The terminal is seeking to obtain a facility-wide Permit to Construct (PTC) from the Idaho Department of Environmental Quality (IDEQ).

This modeling analysis demonstrates that the Potential to Emit (PTE) of NO₂ at the terminal is in compliance with both NO₂ National Ambient Air Quality Standards (NAAQS).

This modeling analysis also demonstrates that the PTE of benzene and naphthalene at the terminal are in compliance with Acceptable Ambient Concentrations (AACs) specified in IDAPA 58.01.01, §§ 585 and 586.

Because this PTC will be the first PTC to include the terminal's Vapor Combustion Unit (VCU), the emission rates from the VCU are evaluated at full PTE. There are no 'modifications' represented in this modeling analysis.

2.0 Project Description and Background as it Relates to Modeling Analyses

On March 31, 2014, TLO submitted a Permit to Construct (PTC) application (project number 61344, permit application file number P-2014.0008) to IDEQ in order to convert the terminal's current Tier II operating permit to a facility-wide, synthetic minor PTC. Trinity Consultants (Trinity) supported the development of the March 31, 2014 PTC application.

On May 2, 2014, Harbi Elshafei, IDEQ permit writer with the Air Quality Division, found that the application was incomplete. The requested information was supplied to IDEQ, and a completeness determination was issued June 17, 2014.

On August 4, 2014, Harbi Elshafei provided additional information regarding the VCU's past permit status. The VCU had not previously been permitted with a PTC (its installation was exempt from the PTC process). Therefore, IDEQ requested that the synthetic minor PTC application be withdrawn and resubmitted to include the VCU as a "new" source for PTC purposes.



Air Impact Modeling Analyses Report Form

1.0 Summary

Tesoro Logistics Operations, LLC (TLO) operates a refined petroleum products terminal near Pocatello, ID (the terminal; facility ID number 077-00023). The terminal is seeking to obtain a facility-wide Permit to Construct (PTC) from the Idaho Department of Environmental Quality (IDEQ).

This modeling analysis demonstrates that the Potential to Emit (PTE) of NO₂ at the terminal is in compliance with both NO₂ National Ambient Air Quality Standards (NAAQS).

This modeling analysis also demonstrates that the PTE of benzene and naphthalene at the terminal are in compliance with Acceptable Ambient Concentrations (AACs) specified in IDAPA 58.01.01, §§ 585 and 586.

Because this PTC is the first PTC to include the terminal's Vapor Combustion Unit (VCU), the emission rates from the VCU are evaluated at full PTE. There are no 'modifications' represented in this modeling analysis.

This Model Analysis Report is based closely on the Model Analysis Report submitted with the April 2016 application. A changelog of updates from that report is provided under heading 2.3 below.

This Model Analysis Report includes the following attachments:

- A. The March 2016 model protocol which was included with the PTC application;
- B. Correspondence with IDEQ, TLO, and Trinity Consultants (Trinity) on this project;
- C. Facilitywide emission inventory;
- D. VCU design specifications for stack and hydrocarbon inlet flow;
- E. Tables of model inputs;
- F. VCU stack test;
- G. Tables and aerial plots of model results.

2.0 Project Description and Background as it Relates to Modeling Analyses

On March 31, 2014, TLO submitted a Permit to Construct (PTC) application (project number 61344, permit application file number P-2014.0008) to IDEQ in order to convert the terminal's current

Tier II operating permit to a facility-wide, synthetic minor PTC. Trinity Consultants (Trinity) supported the development of the March 31, 2014 PTC application.

On May 2, 2014, Harbi Elshafei, IDEQ permit writer with the Air Quality Division, found that the application was incomplete. The requested information was supplied to IDEQ, and a completeness determination was issued June 17, 2014.

On August 4, 2014, Harbi Elshafei provided additional information regarding the VCU's past permit status. The VCU had not previously been permitted with a PTC (its installation was exempt from the PTC process). Therefore, IDEQ requested that the synthetic minor PTC application be withdrawn and resubmitted to include the VCU as a "new" source for PTC purposes.

In April 2016, TLO filed a Permit to Construct (PTC) application, to the Idaho Department of Environmental Quality (IDEQ) in order to include the VCU as a "new" sources in the PTC. IDEQ issued a draft PTC on July 11, 2016. The PTC action is in process awaiting draft permit comments and a final permit issuance.

This modeling analysis treats the VCU as a "new" source, and demonstrates that the VCU may receive a PTC according to IDEQ regulations.

2.1 General Facility/Project Description

The Pocatello terminal is located at 1189 Tank Farm Rd., Pocatello, ID 83204. The terminal is home to 23 petroleum product storage tanks (numbers 901 through 922, and 930), of which four (904, 912, 913, and 930) are out of service. The terminal also contains several smaller tanks (a 21,000 gal tank, and several tanks <10,000 gal each) for petroleum product additives.

The terminal receives gasoline and diesel products by pipeline.

The terminal operates a single loading rack for tank trucks. The terminal ships the refined products by tank truck at three loading bays for gasoline and diesel. Pipeline interface is stored in a transmix tank (Tank 902), to be loaded out through a dedicated transmix bay at the loading rack.

Emissions from tank truck loading at all four bays are routed to the VCU by a vapor collection system. The VCU combusts all vapors generated at the loading rack, producing combustion pollutants—primarily NO_x and CO, with negligible amounts of PM and SO₂. The VCU contains a pilot flame which is fueled with natural gas.

The terminal receives and stores denatured ethanol by tank truck for the purpose of blending with gasoline.

Aside from the VCU, the terminal operates one other combustion source, a small comfort heater. These are the only two sources of combustion emissions at the terminal.

Because this PTC is the first PTC to include the terminal's Vapor Combustion Unit (VCU), the emission rates from the VCU are evaluated at full PTE. However, there are no 'modifications' represented in this modeling analysis.

2.2 Location of Project

The Pocatello terminal is located at 1189 Tank Farm Rd., Pocatello, ID 83204. The facility center is in UTM Zone 12 at coordinates 374,809.5 m East; 4,752,788 m North (NAD83 Projection).

The terrain in the area is relatively flat. Within the square area covered by receptors in this modeling analysis, (16 km by 16 km for the NO₂ and combustion TAP models,) the maximum elevation is 1,776.53 m and the minimum elevation is 1,328.07 m.¹

Howard Mountain is located about 6 km to the south of the terminal, and it has a maximum elevation of 1,786 m. Further south are Kinport Peak and Rock Knoll, which are outside the range of receptors in this near-field modeling analysis. To the east of the terminal is the urban area of Pocatello, which is relatively flat. Beyond Pocatello (and outside the receptor grid) are Camelback Mountain and other peaks at the north end of the Wasatch Range.

From the northwest to the southwest lies the American Falls reservoir.

The land use within the receptor grid is primarily agricultural, with some urban areas and some uncultivated land.

An image showing the terminal location and the extent of receptors modeled in this analysis is provided in Figure 1.

_____A map showing the geographical location of the facility is provided in this section or a reference is provided to another location in the application where a map is provided.

¹ As will be described in more detail later in this report, the pollutants modeled in this analysis are benzene, naphthalene, combustion TAP (formaldehyde, arsenic, cadmium, and nickel), and NO₂, of which NO₂ and combustion TAP have a much longer-range receptor grid. Of these pollutants, NO₂ and combustion TAP are the only pollutants emitted from point sources, which have the potential for transport of pollutants over a wider range. Other pollutants are emitted only from volume sources, so fence-line impacts are strongly expected to be greatest, and their associated receptor grids are denser and closer to the terminal fence-line.

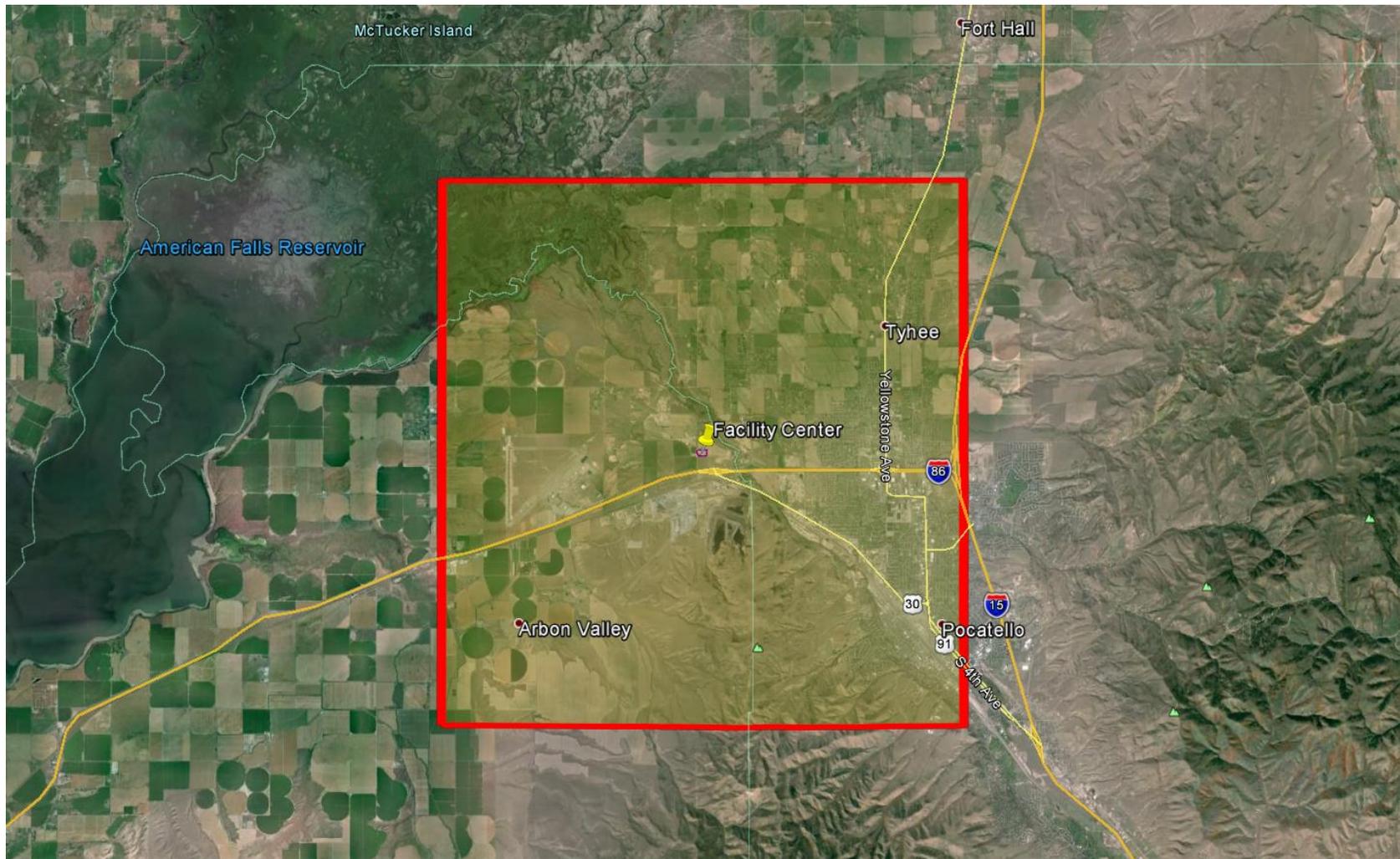


Figure 1. Receptor Grid Extent for Pocatello Terminal Modeling Analysis

2.3 Existing Permits and Modeling Analyses Performed

The terminal currently operates under Tier II operating permit number T2-2008.0026. This Tier II permit is not associated with any modeling analysis. The current modeling analysis does not depend on any prior analysis for its parameters.

Changelog.

The following changes to model inputs and methods have been made to this model analysis and Model Analysis Report, vis-à-vis the April 2016 PTC application's model analysis and report:

1. The loading rack short-term throughput has been increased to reflect a physically limited maximum use case of 10 loading arms of gasoline (550 gpm each), 6 loading arms of diesel (550 gpm each), and 1 loading arm of jet (550 gpm). See heading 4.3 of this report.
2. The NO₂ emission rate of the VCU is re-calculated based on applying the AP-42 Section 1.5 butane emission factor by the quantity of vapors generated per hour given the above throughputs. See heading 4.1 of this report.
3. The stack exhaust velocity of the VCU is re-calculated based on stoichiometric combustion of the quantity of vapors generated per hour given the above throughputs. See heading 4.3 of this report.
4. Models for four additional TAP have been added: formaldehyde, arsenic, cadmium, and nickel. See heading 3.0 of this report.

_____Any existing air quality permits are listed and described in this section, and any associated air quality modeling analyses have been described and referenced, and submitted if appropriate.

3.0 Modeling Analyses Applicability and Protocol

The current PTC application requires a modeling analysis that treats the terminal's VCU as a new source. Emissions from the VCU and the loading rack to which it is connected are the only emissions represented in this modeling analysis.

The loading rack emits fugitive emissions of volatile organic compounds (VOC) including speciated compounds classified as Toxic Air Pollutants (TAP). The VCU also emits VOC, TAP, and combustion pollutants: NO_x, CO, PM (negligible), and SO₂ (negligible).

As described in the following sections, emissions of NO₂, benzene, naphthalene, formaldehyde, arsenic, cadmium, and nickel are subject to modeling requirements.

3.1 Applicable Standards

Criteria pollutant National Ambient Air Quality Standards (NAAQS) are listed in Table 1, along with significant impact levels (SILs).

Table 1. APPLICABLE REGULATORY LIMITS				
Pollutant	Averaging Period	Significant Impact Levels^a (µg/m³)^b	Regulatory Limit^c (µg/m³)	Modeled Design Value Used^d
PM ₁₀ ^e	24-hour	5.0	150 ^f	Maximum 6 th highest ^g
PM _{2.5} ^h	24-hour	1.2	35 ⁱ	Mean of maximum 8 th highest ^j
	Annual	0.3	12 ^k	Mean of maximum 1 st highest ^l
Carbon monoxide (CO)	1-hour	2,000	40,000 ^m	Maximum 2 nd highest ⁿ
	8-hour	500	10,000 ^m	Maximum 2 nd highest ⁿ
Sulfur Dioxide (SO ₂)	1-hour	3 ppb ^o (7.8 µg/m ³)	75 ppb ^p (196 µg/m ³)	Mean of maximum 4 th highest ^q
	3-hour	25	1,300 ^m	Maximum 2 nd highest ⁿ
	24-hour	5	365 ^m	Maximum 2 nd highest ⁿ
	Annual	1.0	80 ^r	Maximum 1 st highest ⁿ
Nitrogen Dioxide (NO ₂)	1-hour	4 ppb (7.5 µg/m ³)	100 ppb ^s (188 µg/m ³)	Mean of maximum 8 th highest ^t
	Annual	1.0	100 ^r	Maximum 1 st highest ⁿ
Lead (Pb)	3-month ^u	NA	0.15 ^r	Maximum 1 st highest ⁿ
	Quarterly	NA	1.5 ^r	Maximum 1 st highest ⁿ
Ozone (O ₃)	8-hour	40 TPY VOC ^v	75 ppb ^w	Not typically modeled

- a. Idaho Air Rules Section 006 (definition for significant contribution) or as incorporated by reference as per Idaho Air Rules Section 107.03.b.
- b. Micrograms/cubic meter.
- c. Incorporated into Idaho Air Rules by reference, as per Idaho Air Rules Section 107.
- d. The maximum 1st highest modeled value is always used for the significant impact analysis unless indicated otherwise. Modeled design values are calculated for each ambient air receptor.
- e. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
- f. Not to be exceeded more than once per year on average over 3 years.
- g. Concentration at any modeled receptor when using five years of meteorological data.
- h. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
- i. 3-year mean of the upper 98th percentile of the annual distribution of 24-hour concentrations.
- j. 5-year mean of the 8th highest modeled 24-hour concentrations at the modeled receptor for each year of meteorological data modeled. For the SIL analysis, the 5-year mean of the 1st highest modeled 24-hour impacts at the modeled receptor for each year.
- k. 3-year mean of annual concentration.
- l. 5-year mean of annual averages at the modeled receptor.
- m. Not to be exceeded more than once per year.
- n. Concentration at any modeled receptor.
- o. Interim SIL established by EPA policy memorandum.
- p. 3-year mean of the upper 99th percentile of the annual distribution of maximum daily 1-hour concentrations.
- q. 5-year mean of the 4th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of 1st highest modeled 1-hour impacts for each year is used.
- r. Not to be exceeded in any calendar year.
- s. 3-year mean of the upper 98th percentile of the annual distribution of maximum daily 1-hour concentrations.
- t. 5-year mean of the 8th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of maximum modeled 1-hour impacts for each year is used.
- u. 3-month rolling average.
- v. An annual emissions rate of 40 ton/year of VOCs is considered significant for O₃.
- w. Annual 4th highest daily maximum 8-hour concentration averaged over three years.

Certain TAP species emitted from the loading rack and VCU are identified in Table 2. While many TAP species are emitted in small quantities, the vast majority are calculated to be below their screening emission levels (ELs). For a full list of screening ELs and Acceptable Ambient Concentrations (AACs), compared with the loading rack and VCU emissions, please refer to the attached emission calculation tables.

Table 2. TAP ELS AND AACs/AACCS			
TAP	Non-Carcinogen or Carcinogen	Screening Emissions Level (EL)^a (lb/hr)	AAC or AACCS^b (µg/m³)
Benzene	Carcinogen	0.0008	0.12
Naphthalene (As PAC)	Carcinogen	0.000091	0.014
Naphthalene (As non-carcinogenic TAP)	Non-Carcinogen	3.33	2.5
Formaldehyde	Carcinogen	0.00051	0.077
Arsenic	Carcinogen	0.0000015	0.00023
Cadmium	Carcinogen	0.0000037	0.00056
Nickel	Carcinogen	0.000027	0.0042
Others	Various	Various	Various

^a. ELs from Idaho Air Rules Section 585 and 586 in pounds/hour .

^{b.} Acceptable Ambient Concentration (AAC) or Acceptable Ambient Concentration for a Carcinogen (AACC) from Idaho Air Rules Section 585 and 586, in micrograms/cubic meter or milligrams/cubic meter. Note that AACs listed in Idaho Air Rules Section 585 are expressed in units of milligrams/cubic meter rather than micrograms/cubic meter.

_____All TAPs identified in the emissions inventory for the project are listed in the TAPs EL and AAC/AACC Table in this section.

3.2 Criteria Pollutant Modeling Applicability

Table 3 lists criteria pollutants for which site-specific modeling analyses were performed to demonstrate compliance with the NAAQS.

Table 3. MODELING APPLICABILITY		
Criteria Pollutant	Modeled (yes/no)	Basis for Exclusion from Modeling
PM _{2.5} 24-hour	No	<input checked="" type="checkbox"/> _X_BRC Exempt ^a <input type="checkbox"/> _Emissions Below Level I Thresholds ^b <input type="checkbox"/> _Emissions Below Level II Thresholds ^c
PM _{2.5} annual	No	<input checked="" type="checkbox"/> _X_BRC Exempt <input type="checkbox"/> _Emissions Below Level I Thresholds <input type="checkbox"/> _Emissions Below Level II Thresholds
PM ₁₀ 24-hour	No	<input checked="" type="checkbox"/> _X_BRC Exempt <input type="checkbox"/> _Emissions Below Level I Thresholds <input type="checkbox"/> _Emissions Below Level II Thresholds
NO ₂ 1-hour	Yes	<input type="checkbox"/> _BRC Exempt <input type="checkbox"/> _Emissions Below Level I Thresholds <input type="checkbox"/> _Emissions Below Level II Thresholds
NO ₂ annual	Yes	<input type="checkbox"/> _BRC Exempt <input type="checkbox"/> _Emissions Below Level I Thresholds <input type="checkbox"/> _Emissions Below Level II Thresholds
SO ₂ 1-hour, 3-hour	No	<input checked="" type="checkbox"/> _X_BRC Exempt <input type="checkbox"/> _Emissions Below Level I Thresholds <input type="checkbox"/> _Emissions Below Level II Thresholds
SO ₂ annual	No	<input checked="" type="checkbox"/> _X_BRC Exempt <input type="checkbox"/> _Emissions Below Level I Thresholds <input type="checkbox"/> _Emissions Below Level II Thresholds
CO 1-hour, 8-hour	No	<input type="checkbox"/> _BRC Exempt <input checked="" type="checkbox"/> _X_Emissions Below Level I Thresholds <input type="checkbox"/> _Emissions Below Level II Thresholds
Pb annual	No	<input checked="" type="checkbox"/> _X_BRC Exempt <input type="checkbox"/> _Emissions Below Level I Thresholds <input type="checkbox"/> _Emissions Below Level II Thresholds

- ^{a.} If the project would have qualified for a Category I BRC permitting exemption for the criteria pollutant in question, as per Idaho Air Rules Section 221.01, except for the emissions quantities of another criteria pollutant, then a NAAQS compliance analysis is not required under Section 203.02 or 403.02 for that criteria pollutant.
- ^{b.} Level I Modeling Thresholds from Table 2 in Section 3 of the DEQ Modeling Guideline. NAAQS compliance is assured through DEQ's non-site-specific modeling analyses.
- ^{c.} Level II Modeling Thresholds from Table 2 in Section 3 of the DEQ Modeling Guideline. NAAQS compliance is assured through DEQ's non-site-specific modeling analyses. Level II Modeling Thresholds can only be used with prior DEQ approval.

Table 4 below replicates the table of comparison of VCU emissions against the Level I thresholds. The level I thresholds are more stringent (i.e. lower) than IDEQ's Level II thresholds. For a full calculation for each of the criteria pollutant emission rates from the VCU, please refer the attached emission calculation tables.

Table 4. Criteria Pollutant Modeling Threshold Comparisons

Pollutant	Annual VCU Emissions^a (tpy)	Level I Threshold^a (tpy)	Meets Threshold?	Annual NG Combustion Emissions^a (tpy)	Total Criteria Pollutant Emissions (tpy)
NO _x	3.23	1.20	Exceeding	0.05	3.28
CO	1.81	--	--	0.04	1.85
Pollutant	Annual VCU Emissions^a (tpy)	BRC Threshold^c (tpy)	Meets Threshold?		
PM ₁₀	0.17	2.50	BRC		
PM _{2.5}	0.17	1.50	BRC		
SO ₂	0.02	4.00	BRC		
Pollutant	Short-Term VCU Emissions^b (lb/hr)	Level I Threshold^a (lb/hr)	Meets Threshold?	Short-Term NG Combustion Emissions^b (lb/hr)	Total Criteria Pollutant Emissions (lb/hr)
NO _x	8.99	0.20	Exceeding	0.01	9.00
CO	5.03	15.00	Meets Level I	0.01	5.04

a. Total annual potential emissions from the VCU are provided in Tables C-7 and C-13 in Attachment C. Loading rack emissions VOC are calculated using the emission factor shown in Table C-7a, while emissions of CO, NO_x, PM, and SO₂ are estimated in Table C-7b. Criteria pollutant emissions from natural gas combustion at the comfort heater are calculated in Table C-13. (Emissions from the comfort heater are calculated at PTE for both hourly and annual emissions, so hourly emission rates convert exactly to annual emission rates.) Annual Level I thresholds from IDEQ modeling guidance are used to determine whether each pollutant requires a modeling demonstration.

b. Total short-term potential emissions of criteria pollutants are calculated in Tables C-13 and C-14d. The basis for short-term emissions is the maximum short-term throughput of the loading rack, rather than the maximum annual throughput proposed in the PTC application.

c. Pollutants that are Below Regulatory Concern (BRC) are within the Category I PTC exemption for IDEQ review, and these pollutants are not treated as subject to PTC review or PTC modeling review. Per IDAPA 58.01.01.221.01, a source is BRC if "the maximum capacity of a source to emit an air pollutant under its physical and operational design considering limitations on emissions such as air pollution control equipment, restrictions on hours of operation and restrictions on the type and amount of material combusted, stored or processed shall be less than ten percent (10%) of the significant emission rates set out in the definition of significant at Section 006."

____ Explanations/documentation why modeling was or was not performed for each criteria pollutant are provided in this section.

____ Emissions calculations that clearly show how the modeling applicability determination was performed are provided in this section.

3.3 TAP Modeling Applicability

Please refer to the attached emission calculations tables to review a complete comparison of all TAP species emission rates to screening ELs.

TAP reviewed in this analysis originate in one of two ways: either as trace quantities in the hydrocarbons emitted as fugitives at the loading rack, or as combustion byproducts at the VCU or comfort heater.

Two TAP scenarios are reviewed. First, the uncontrolled emission rate is calculated using the assumption (for permitting purposes only) that the VCU is not installed. Second, the controlled emission rate is calculated using the assumption (true to operation) that the VCU combusts all vapors.

For TAP species which are emitted only during combustion from the VCU, the controlled emission rate is truly the rate when the VCU is not operating (namely 0); therefore, both uncontrolled and controlled emission rates are compared with the screening ELs. The outcome of this analysis, however, remains the same regardless of whether the uncontrolled emission rate is taken to be with or without the VCU operational.

The screening ELs for benzene, naphthalene as polycyclic aromatic compound (PAC), formaldehyde, arsenic, cadmium, and nickel are exceeded, while the screening ELs for all other pollutants (including naphthalene's non-carcinogenic screening EL) are not.

Compliance with the program is demonstrated on a pollutant-by-pollutant basis, for each emission unit subject to permitting. A pollutant is in compliance with the TAP program if any of the following conditions can be met:

1. The uncontrolled emission rate of the pollutant is below the screening EL promulgated by IDEQ at §§ 585-86 (§210.05).
2. The uncontrolled ambient concentration of the pollutant, determined by a modeling analysis, is below the Acceptable Ambient Concentration (AAC) promulgated by IDEQ at §§ 585-86 (§210.06).
3. The controlled emission rate of the pollutant is below the screening EL promulgated by IDEQ at §§ 585-86, and the uncontrolled ambient concentration of the pollutant, determined by a modeling analysis, is below the AAC promulgated by IDEQ at §§ 585-86 (§210.07).
4. The controlled ambient concentration of the pollutant, determined by a modeling analysis, is below the AAC promulgated by IDEQ at §§ 585-86 (§210.08). If this method is used, IDEQ will establish a permit condition with an emission rate for the pollutant no greater than the emission rate used in modeling.
5. The "toxic air pollutant from the source or modification is regulated by the Department at the time of permit issuance under 40 CFR Part 60, 40 CFR Part 61 or 40 CFR Part 63" (§210.20).

Because the uncontrolled emission rate of each TAP other than benzene, naphthalene (as PAC), formaldehyde, arsenic, cadmium, and nickel is below the corresponding screening EL, each TAP other than the ones previously mentioned is in compliance with IDAPA §210 by path 1 above.

Furthermore, emissions of federal Hazardous Air Pollutants (HAP) from gasoline loading are currently regulated under National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart R. Benzene and naphthalene emissions from gasoline loading are so regulated, and will be so regulated at the time of permit issuance. A justification of this regulatory applicability has been provided in the permit application. Therefore, benzene and naphthalene emissions from gasoline loading are in compliance with IDAPA §210 by path 5 above. Benzene is contained only in gasoline and transmix; therefore, only transmix sources of benzene are modeled, and gasoline-related emissions of benzene from the VCU are not modeled.

Remaining emissions of benzene (transmix loading fugitives, transmix loading vapor combustion, and natural gas combustion at the VCU and comfort heater) and of naphthalene (diesel and transmix loading fugitives, diesel and transmix loading vapor combustion, and natural gas combustion at the VCU and comfort heater) are modeled in this analysis.

_____ Explanation/documentation on why modeling was or was not performed for emissions of each TAP identified in the emissions inventory of the application are provided in this section.

3.4 Model Analysis Report

The original model protocol in support of this Model Analysis Report was approved by IDEQ on March 18, 2016. A copy of this protocol can be found in Attachment A to this submittal. This Model Analysis Report contains final model results in Section 6.

IDEQ approved the protocol with four supporting comments. The protocol approval letter may be found in Attachment B to this submittal. The following are brief responses to each comment, including the locations of responsive material available in this submittal:

1. Emission Rates and Project Modeling Applicability. A complete emission inventory is presented in Attachment C to this submittal. Certain benzene and naphthalene emissions are exempt from modeling. These emissions are subject to NESHAP Subpart R, as described above.
2. Justification of Release Parameters. Relevant material from the original vendor proposal for the VCU is included in Attachment D, specifying the VCU release height, stack diameter, and maximum design hydrocarbon vapor intake. The terminal does not maintain a record of the comfort heater's exhaust parameters; however, due to its low emission rate and low modeled ambient impact, the sensitivity of the model outcomes to this source is negligible.
3. Receptor Grid. In evaluating the placement of receptor grids in the model protocol, IDEQ noted, "Please note that if the project's final impacts are close to those presented in the modeling protocol further refinement of the receptor grid is not likely to be an issue." As

the model results in this final report remain between 3% and 35% of the relevant thresholds, the receptor grids have not been supplemented with additional densely-spaced grids.

4. Building Downwash. Tables of the dimensions of on-site structures, including tanks, are provided in Appendix H of this submittal. For conservatism, no on-site structures were excluded from the model on the basis of height and relative distance from the VCU stack.

____ If a protocol was submitted to DEQ prior to performing the modeling analyses, the protocol and DEQ's conditional protocol approval notice is included in Attachment ____ of this Modeling Report.

____ Concerns identified by DEQ in the protocol approval notice have been addressed in the analyses performed and in this Modeling Report.

4.0 Modeled Emissions Sources

The following emission sources are modeled in this analysis:

- Loading Rack (Product Bays): BAY1_1, BAY1_2, BAY1_3, BAY2_1, BAY2_2, BAY2_3, BAY3_1, BAY3_2, BAY3_3
- Loading Rack (Transmix Bay): BAYT_1, BAYT_2, BAYT_3
- Comfort Heater: FURN
- VCU: VCU

The operational schedule is assumed to be 100% for each unit, as the units are modeled using PTE emission rates.

The VCU emits NO₂, benzene, naphthalene, formaldehyde, arsenic, cadmium, and nickel. The VCU emission rates for benzene and naphthalene include aggregate product loading (less gasoline), transmix loading, and pilot gas combustion emissions. These pollutants are only modeled on an annual basis. The VCU emission rate for NO₂ aggregates all expected NO₂ emissions, from all loading and pilot gas combustion. The NO₂ emission rate is tied to the throughput of product at the loading rack. Therefore, short-term emissions of NO₂ (based on maximum rack throughput multiplied across a maximum 75% efficiency of time spent loading per hour) are greater than annual emissions (based on facility throughput limits).

The loading rack's product bay and transmix bay sources emit only benzene and naphthalene, not NO₂ or other combustion TAP. Therefore, they are modeled only against annual averaging periods. In the attached emission calculation tables, emissions are calculated for diesel/transmix benzene and for gasoline/diesel/transmix naphthalene. The gasoline and diesel emissions are equally apportioned among nine volume sources, in three triads arranged as lines east to west, which represent the three product loading bays. The transmix emissions are equally apportioned among a fourth triad arranged to represent the transmix loading bay.

The comfort heater's emissions are calculated using AP-42 emission factors for NO₂, benzene, naphthalene, formaldehyde, arsenic, cadmium, and nickel. Because the heater is assumed to operate at all hours, the short-term and annual emission rates are equal for all pollutants. The comfort heater is a single point source, and all emissions are emitted through that point source.

Please refer to the attached emission calculation tables for a detailed calculation of each emission rate and source parameter.

_____The modeling emissions inventory and the emissions inventory presented in other parts of the permit application are consistent, and if they are not identical numbers, it is clearly shown, with calculations submitted, how the modeled value was derived from the value provided in the emissions inventory.

4.1 Criteria Pollutants

Table 5 below provides a statement of each criteria pollutant emission rate modeled in this analysis. For a full calculation for each of the criteria pollutant emission rates from the VCU, please refer the attached emission calculation tables.

Table 5. Criteria Pollutant Modeling Emission Rates (NO_x)

Emission Source	Heat Rate (Btu/hr)	Annual Emissions		Short-Term Emissions	
		(tpy)	(g/s)	(lb/hr)	(g/s)
VCU	--	3.23	9.299E-02	8.99	1.133E+00
Heater #1	105,000	0.05	1.297E-03	0.01	1.297E-03
Total		3.28	9.428E-02	9.00	1.134E+00

4.1.1 Modeled Emissions Rates for Significant Impact Level Analyses

Table 6 below provides a statement of each criteria pollutant emission rate modeled in the Significant Impact Level (SIL) analysis. For a full calculation for each of the criteria pollutant emission rates from the VCU and heater, please refer the attached emission calculation tables.

Table 6. MODELED EMISSIONS RATES FOR SIL ANALYSES				
Source ID	Source Description	Pollutant	Averaging Period	Emissions ^a (lb/hr)
VCU	Vapor Combustion Unit	NO _x	1-hour	8.99
			Annual	0.73

^a Pound/hour emissions rate modeled is the project-specific increase in potential/allowable emissions increase for the averaging period specified for the pollutant.

_____ Emissions rates in Table 6 are identical to those in the model input files for SIL analyses.

_____ Calculation of modeled emissions are thoroughly documented in this section, and any unique handling of emissions in the model have been described.

4.1.2 Modeled Emissions Rates for Cumulative Impact Analyses

Table 7 below provides a statement of each criteria pollutant emission rate modeled in the cumulative NAAQS analysis. For a full calculation for each of the criteria pollutant emission rates from the VCU and heater, please refer the attached emission calculation tables.

Because the associated PTC application treats the VCU as a new source, the VCU's PTE emission rate is used in both the SIL and NAAQS analyses. In the NAAQS analysis, the FURN source representing the comfort heater is included for completeness. No other NO_x sources are located at the terminal.

Source ID	Source Description	Pollutant	Averaging Period	Emissions ^a (lb/hr)
VCU	Vapor Combustion Unit	NO _x	1-hour	8.99
			Annual	0.73
FURN	Comfort Heater	NO _x	1-hour	0.01
			Annual	0.01

^a. Pound/hour emissions rate modeled is the project-specific increase in potential/allowable emissions increase for the averaging period specified for the pollutant.

____ Emissions rates in Table X are identical to those in the model input files for the cumulative NAAQS impact analyses.

____ Calculation of modeled emissions are thoroughly documented in this section (unless already described in Section 4.1.1), and any unique handling of emissions in the model have been described.

4.1.3 NO₂/NO_x Ratio for NO_x Chemistry Modeling

A constant NO₂ / NO_x ambient concentration ratio is used in the modeling analysis following the Ambient Ratio Method (ARM). NO_x results are converted to NO₂ results using a scaling factor of 0.75 for annual and 0.8 for 1-hour NO_x model outcomes. ARM2, OLM, and PVMRM options are not used in this modeling analysis.

4.1.4 Special Methods for Modeling Criterial Pollutant Emissions

No special methods other than ARM are used in this criteria pollutant modeling analysis.

4.2 Toxic Air Pollutants

Table 8 lists TAP emissions rates that were included in modeling analyses. Modeling was performed for each TAP having total project emissions exceeding the TAP-specific Screening Emissions Level (EL) and will not be regulated under a NESHAP at the time of permit issuance, as described in Section 3.3 above.

Source ID	Source Description	TAP	Averaging Period	Emissions ^a (lb/hr)
VCU	VCU	Benzene	annual	2.008E-04
		Naphthalene	annual	1.488E-05
		Formaldehyde	annual	1.125E-04
		Arsenic	annual	2.999E-07
		Cadmium	annual	1.649E-06
		Nickel	annual	3.149E-06
BAY1_1		Benzene	annual	0

	Fugitive Emissions from Loading Rack	Naphthalene	annual	4.384E-07
BAY1_2	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	4.384E-07
BAY1_3	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	4.384E-07
BAY2_1	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	4.384E-07
BAY2_2	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	4.384E-07
BAY2_3	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	4.384E-07
BAY3_1	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	4.384E-07
BAY3_2	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	4.384E-07
BAY3_3	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	4.384E-07
BAYT_1	Fugitive Emissions from Transmix Bay	Benzene	annual	6.562E-06
		Naphthalene	annual	5.930E-09
BAYT_2	Fugitive Emissions from Transmix Bay	Benzene	annual	6.562E-06
		Naphthalene	annual	5.930E-09
BAYT_3	Fugitive Emissions from Transmix Bay	Benzene	annual	6.562E-06
		Naphthalene	annual	5.930E-09
FURN	Comfort heater (natural gas)	Benzene	annual	2.162E-07
		Naphthalene	annual	6.279E-08
		Formaldehyde	annual	7.721E-06
		Arsenic	annual	2.059E-08
		Cadmium	annual	1.132E-07
		Nickel	annual	2.162E-07

^a Pounds/hour emissions rate modeled is the project-specific increase in potential/allowable emissions increase for the averaging period specified for the TAP.

____TAP emissions rates have been listed for each TAP that has project cumulative emissions exceeding the applicable EL.

____Emissions rates in Table 8 are identical to those in the model input file for TAP analyses.

4.3 Emissions Release Parameters

Table 9 lists stack parameters for point sources and Table 10 lists release parameters for volume and area sources.

Release Point	Description	UTM ^a Coordinates		Stack Height (m)	Stack Gas Flow Temp. (K) ^c	Stack Gas Flow Velocity (m/sec) ^d	Modeled Stack Diameter (m)	Orient. Of Release ^e
		Easting-X (m) ^b	Northing-Y (m)					
VCU	VCU	374718	4752779	10.67	592.59	2.28	2.44	V
FURN	Comfort heater (natural gas)	374745	4752746	4.27	Ambient	1.92	7.62E-02	V

- a. Universal Transverse Mercator.
- b. Meters.
- c. Kelvin.
- d. Meters per second.
- e. Vertical uninterrupted, rain-capped, or horizontal release.

Coordinates for the point sources are given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility. Release height and stack diameter for the VCU and comfort heater stack are based on measurements at the Pocatello site.

The VCU exhaust temperature estimate is based on an attached source test (November 9, 2001) for the VCU. Stack exit velocity is based on an exhaust rate of 1,737,594 scf over the 6-hour test duration. Full calculations are provided in the attached calculation tables.

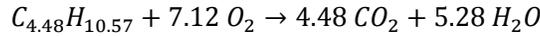
Both stacks are equipped with uncapped vertical release points.

The key change in the VCU stack parameters, vis-à-vis the April 2016 PTC application, is that the exit velocity has been updated from 0.99 m/s to 2.28 m/s.

In the April 2016 PTC application, the furnace exhaust velocity was based on converting 0.105 MMBtu/hr to exhaust gas using EPA Method 19. In the current model analysis, the VCU stack flow rate is based on the calculated amount of hydrocarbon fed to the VCU at the maximum use case for the product loading rack, as limited only by the possible physical configurations of trucks and loading arms. These calculations can be found in Attachment E, Tables E-4a through 4c.

In summary, the product loading rack can operate, at maximum, up to 10 arms of gasoline loading, 6 arms of diesel loading, and 1 arm of transmix loading. Based on 550 gallons per minute (gpm) per arm for gasoline, diesel, and transmix, the product loading rack can load 5,500 gpm gasoline, 3,300 gpm diesel, and 550 gpm transmix. Given emission factors for these fuels, the VCU can combust up to 304 scfm (18,263 scfh) of hydrocarbon vapors, which, mixed with air in the truck vapor spaces, are collected and routed to the VCU. Because of the disparity in vapor pressures, 93.8% of this vapor is generated from the 10 gasoline arms, with 5.8% generated from transmix (the vapors of which are caused primarily by its gasoline content), and the remaining 0.4% generated from diesel loading and the VCU natural gas pilot light.

A standard EPA speciation for the hydrocarbon vapors² gives a value of 4.48 mol carbons and 10.57 mol hydrogens per mol of hydrocarbon vapor. The following complete combustion reaction is postulated:



Therefore, if 18,263 scfh of hydrocarbon vapors are fed to the VCU, then 130,105 scfh of O₂ will be consumed, 96,500 scfh H₂O produced, and 81,855 scfh CO₂ produced.

The VCU is rated to destroy 642 scfm hydrocarbon-laden vapor at a concentration of 60 mol% hydrocarbon and 40 mol% air, or 385.2 scfm of hydrocarbon vapor. A specification sheet is provided in Attachment H. Therefore, the VCU's combustion capacity is not limiting; rather the product loading rack maximum use case is limiting, as assumed here.

Furthermore, this VCU rating shows that the VCU can draw in the excess air capable of reaching the 304 scfm (18,263 scfh) of hydrocarbon vapors, which must be combusted in the product loading rack maximum use case. For conservatism, it is assumed that the VCU draws in exactly the necessary combustion air (0% excess oxygen, i.e., stoichiometric conditions). That air can come from the VCU's stack base louvers, the assist air blower, and the air entrained in hydrocarbon-laden vapors collected from tank trucks. If stoichiometric conditions are assumed, then the VCU uses 622,510 scfh air to provide the 130,105 scfh of O₂ to combust 18,263 scfh of hydrocarbon vapors. All of the 130,105 scfh of O₂ is consumed, leaving 492,406 scfh N₂ and other inerts to pass through as exhaust vapor.

Therefore, the stack flow of the VCU is computed to be:

$$\begin{aligned} \text{Flow Rate, scfh} &= \\ &(492,406 N_2 \text{ and other inerts} + 130,105 O_2 + 18,263 C_{4.48}H_{10.57}) \\ &- (18,263 C_{4.48}H_{10.57} + 130,105 O_2) \\ &+ (81,855 CO_2 + 96,500 H_2O) \\ &= 670,761 \text{ scfh exhaust total} \end{aligned}$$

Converting this value based on a stack temperature of 607 °F and standard temperature of 68 °F, converting to m³/s, and dividing by stack cross-sectional area yields an exit velocity of 2.28 m/s

Source	Description	UTM ^a Coordinates		Release Height (m)	Horizontal Dimension (m)	Vertical Dimension (m)
		Easting - X (m) ^a	Northing - Y (m)			
BAY1_1	Fugitive Emissions from Loading Rack	374838	4752760	1.63	1.13	1.51
BAY1_2		374836	4752760	1.63	1.13	1.51
BAY1_3		374834	4752760	1.63	1.13	1.51
BAY2_1		374838	4752750	1.63	1.13	1.51

² EPA-450/2-77-026, "Control of Hydrocarbons from Tank Truck Gasoline Loading Terminals", Table 2-2 (October, 1977).

BAY2_2		374836	4752750	1.63	1.13	1.51
BAY2_3		374834	4752750	1.63	1.13	1.51
BAY3_1		374838	4752740	1.63	1.13	1.51
BAY3_2		374836	4752740	1.63	1.13	1.51
BAY3_3		374834	4752740	1.63	1.13	1.51
BAYT_1	Fugitive Emissions from Transmix Bay	374838	4752732	1.63	1.13	1.51
BAYT_2		374836	4752732	1.63	1.13	1.51
BAYT_3		374834	4752732	1.63	1.13	1.51

^a. Universal Transverse Mercator

^b. Meters

Coordinates for the loading rack are given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility. Coordinates of the individual volume sources are based on the three product loading bays and the single transmix loading / ethanol offloading bay at the loading rack. Based on the plot plans and aerial imagery, the centerlines of each bay are 10 m apart. The bays run east to west. Therefore, Bay 1 is 31 ft north of Bay 2, and Bay 3 is 31 ft south. With regard to the number and spacing of volume sources: each tank truck is approximately 8.0 feet wide. This width is used to define volume source spacing as described in EPA's AERMOD user guide, Table 3-1, and EPA's 1995 ISCST3 model user guide, Figure 1-8a. According to this figure, each volume source is to be spaced 8.0 feet apart. Each truck is approximately 23 ft long. $23 \text{ ft} / 8.0 \text{ ft} = 2.875$, so three volume sources are used to represent each bay. The volume sources are located with reference to the center of the loading rack: one 8 ft west of the centerline, one located on the centerline, and one 8 ft east of the centerline for each bay.

Volume source initial vertical dimensions are based on the estimated height of a gasoline tank truck. The tank truck height is set to 3.25 meters, and the central release height is taken to be the middle of the truck. Volume source initial lateral dimension is calculated as the truck width / 2.15, as described in footnote a, for adjacent volume sources forming a line source, in accordance with the State of Idaho Modeling Guideline. Each volume source in the adjacent sources is identical.

_____Thorough justification/documentation of release parameters for all modeled sources is provided in this section.

_____The specific methods used to determine/calculate given release parameters is described in this section.

_____The release orientation of all point source stacks (horizontal, rain-capped, or uninterrupted vertical release) has been verified and is documented in this section.

5.0 Modeling Methodology

Table 11 summarizes the key modeling parameters used in the impact analyses.

Table 11. MODELING PARAMETERS		
Parameter	Description/Values	Documentation/Addition Description
General Facility Location	Attainment	The facility is in attainment of NO ₂ NAAQS. Background concentrations of NO ₂ are well below NAAQS design values.
Model	AERMOD	AERMOD with the PRIME downwash algorithm, version 15181.
Meteorological Data	KPIH (WBAN 24156) surface data With KBOI (WBAN 24131) upper air data	The meteorological model input files for this project were developed by Cheryl Robinson (IDEQ) using AERMET 12345. See Section 5.2 of this memorandum for additional details of the meteorological data.
Terrain	Considered	3-dimensional receptor coordinates were obtained from USGS National Elevation Dataset (NED) files and were used to establish elevation of ground level receptors. AERMAP was used to determine each receptor elevation and hill height scale.
Building Downwash	Considered	Plume downwash was considered for all structures associated with the facility. BPIP-PRIME was used to evaluate building dimensions for consideration of downwash effects in AERMOD. Building parameters are provided in Section 5.5 and in the attached calculation tables. No buildings were excluded from the BPIP-PRIME analysis.
NO _x Chemistry	ARM	A straightforward ARM approach is used to scale NO ₂ results from NO _x results, using 0.75 for annual results and 0.8 for 1-hour results.
Receptor Grid	Significant Impact Analyses	
	Grid 1	10-meter spacing along the ambient air boundary
	Grid 2	10-meter spacing in a 1,500 meter (easting) by 1,500 meter (northing) grid centered on the facility
	Grid 3	25-meter spacing in a 2,000 meter (easting) by 2,000 meter (northing) grid centered on the facility
	Grid 4	50-meter spacing in a 4,000 meter (easting) by 4,000 meter (northing) grid centered on the facility
	Grid 5	100-meter spacing in a 16,000 meter (easting) by 16,000 meter (northing) grid centered on the facility
	NAAQS Analyses	
	The same receptor grid is used for both SIL and NAAQS analyses.	
	TAPs Analyses	
	The receptor grid for TAP is equivalent to Grid 1 and Grid 2 mentioned above. TAP impacts occur close to the fence line as they are primarily emitted from fugitive sources.	

5.1 Model Selection

EPA's AERMOD near-field Gaussian dispersion model, version 15181, was used to prepare this analysis.

National Elevation Dataset (NED) data with 1/3 arc-second resolution was processed using EPA's AERMAP terrain preprocessor, version 11103.

IDEQ provided meteorological data processed with EPA's AERMET meteorological pre-processor, version 12345. The meteorological data is IDEQ's preferred data set.

_____The current versions of all models and associated programs were used in analyses, or alternate versions were specifically approved by DEQ.

_____Any non-default model options used were approved by DEQ in advance.

5.2 Meteorological Data

IDEQ provided model-ready meteorological data from 2008 to 2012, processed with EPA's AERMET meteorological pre-processor. IDEQ's data processing report and input files are attached. The meteorological model input files for this project were developed by Cheryl Robinson (IDEQ) using AERMET 12345. IDEQ relied on raw meteorological surface station observations from station KPIH (WBAN 24156) and raw upper air observations from upper-air station KBOI (WBAN 24131).

_____Meteorological data files are provided with the application.

_____If meteorological data used for modeling were not provided by DEQ, then a detailed discussion of the data is provided along with documentation of the processing steps.

5.3 Effects of Terrain

NED terrain data were retrieved in GeoTIFF format, in the NAD83 datum, from the Multi-Resolution Land Characteristics (MRLC) Consortium online viewer at <http://www.mrlc.gov/viewerjs/>. Data were retrieved in 1/3-arc-second format. All model elements including sources and buildings are georeferenced with respect to the NAD83 datum.

_____The datum of terrain data, building corner locations, emissions sources, and the ambient air boundary are specified and are consistent such that the modeled plot plan accurately represents the facility and surroundings.

5.4 Facility Layout

Figures 2 and 3 provide georeferenced plots of the terminal's buildings and sources on aerial imagery of the terminal. Figure 2 indicates the locations of point sources with labels, while Figure 3 indicates the locations of all point sources, volume sources, and buildings.



Figure 2. Aerial Image of Pocatello Terminal

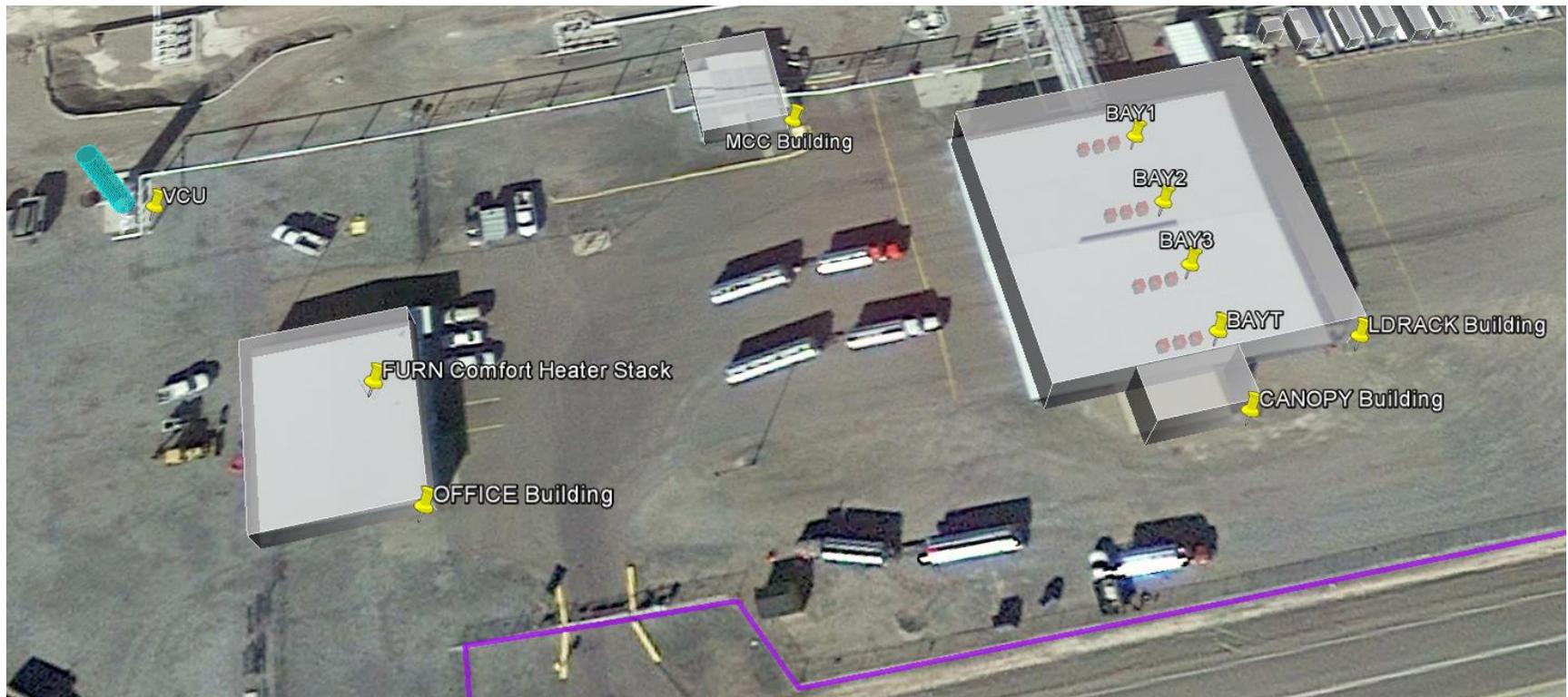


Figure 3. Aerial Image of Pocatello Terminal Emission Sources

_____The facility layout plot plan is provided in this section that clearly and accurately depicts buildings, emissions points, and the ambient air boundary.

_____This section of the Modeling Report has thoroughly described how locations of emissions sources, building corners, and the ambient air boundary were determined, specifying the datum used.

5.5 Effects of Building Downwash

Building location data were obtained by georeferencing buildings using aerial imagery. The outcome of the georeferencing process is visible in Figures 2 and 3.

Building height data were obtained from on-site facility measurements of tanks and structures. A full set of building heights is provided in the attached calculations.

All buildings at the facility were processed using BPIP-PRIME. No buildings were removed from the analysis based on distance from stacks.

5.6 Ambient Air Boundary

The ambient air boundary is marked in purple in Figure 2. The selection of the ambient boundary is straightforward. It follows the facility boundary fence closely. The facility's fence and accompanying signage deter public access. The modeling analysis does not exclude receptors from any leased property. The facility does not admit the general public to the facility as part of its business operations.

_____If any of the following apply, the effect on areas excluded from ambient air is thoroughly described in this section: a river/stream bisecting the facility; the facility is on leased property or is leasing property to another entity; the facility is not completely fenced; there are right-of-way areas on the facility; the nature of business is such that the general public have access to part or all of the facility.

_____This section thoroughly describes how the facility can legally preclude public access (and practically preclude access) to areas excluded from ambient air in the modeling analyses.

5.7 Receptor Network

The extent of the receptor grids is provided in Table 11.

IDEQ's Modeling Guideline suggests three criteria on which to evaluate the adequacy of a receptor grid:

- Whether the modeled concentrations are reasonably close to a threshold value;
- How much the receptor with the maximum modeled concentration exceeds its neighbors; and
- Whether the terrain features nearby the modeling domain may cause higher impacts outside the modeling domain.

With regard to threshold values, no modeled concentration is expected to approach within 10% of a threshold value.

With regard to the excess of the maximum modeled concentration over its neighboring receptors, the model results do not show a steep concentration gradient. Benzene and naphthalene impacts arise primarily from volume sources within the facility fenceline. NO₂ and combustion TAP impacts arise from a plume. A receptor grid spacing of 10 m, extending from the terminal fenceline to the grid of 1,500 m square centered on the facility, is expected to capture all points of peak impact.

With regard to terrain features, as described in Section 2.2, terrain within the modeling domain is flat except for some hilly land near the south edge (~6 km from the terminal). Benzene and naphthalene impacts are due to volume sources, so transport of the pollutants to 6 km is not expected. NO₂ and combustion TAP impacts may occur at longer ranges; however, previously submitted modeling for the Boise, ID terminal indicates that a fenceline 1-hour impact is likely to remain higher than any impacts at long range.

_____ This section of the Modeling Report provides justification that receptor spacing used in the air impact analyses was adequate to reasonably resolve the maximum modeled concentrations to the point that NAAQS or TAP compliance is assured.

5.8 Background Concentrations

A background concentration is used in the cumulative analysis for NO₂. The backgrounds are determined at the terminal's center: 374,809.5 m E, 4,752,788 m N, UTM Zone 12 (NAD83). The backgrounds are determined using a publicly available, online tool developed by the Washington State University Laboratory for Atmospheric Research's Northwest International Air Quality Environmental Science and Technology Consortium (NW-AIRQUEST; <http://www.lar.wsu.edu/index.html>). The following data were retrieved:

- 1-Hour NO₂: 18 ppb (33.9 µg/m³)
- Annual NO₂: 3.9 ppb (7.34 µg/m³)

_____ Background concentrations have been thoroughly documented and justified for all criteria pollutants where a cumulative NAAQS impact analysis was performed.

5.9 NO_x Chemistry

A constant NO₂ / NO_x ambient concentration ratio is used in the modeling analysis following the Ambient Ratio Method (ARM). NO_x results are converted to NO₂ results using a scaling factor of 0.75 for annual and 0.8 for 1-hour NO_x model outcomes. ARM2, OLM, and PVMRM options are not used in this modeling analysis.

____If OLM or PVMRM was used to address NO_x chemistry, reasons for selecting one algorithm over the other are provided in this section.

6.0 Results and Discussion

Results of the model analysis described in this Model Analysis Report are provided below.

6.1 Criteria Pollutant Impact Results

6.1.1 Significant Impact Level Analyses

Results of the annual and 1-hour NO₂ SIL analysis exceed the respective SILs.

No multiple operational scenarios are used in this modeling analysis.

Table 12 provides the results of the SIL analyses. Values are adjusted to reflect the ARM (0.75 scaling factor for annual results; 0.8 scaling factor for 1-hour results).

Pollutant	Averaging Period	Maximum Modeled Concentration (µg/m³)^a	Significant Contribution Level (µg/m³)	Impact Percentage of Significant Contribution Level	Cumulative NAAQS Analysis Required
NO ₂ ^d	1-hour	90.32 ^g	7.5	1,201%	Yes
	Annual	0.50	1.0	50%	No

a. Micrograms/cubic meter

b. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.

c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.

d. Nitrogen dioxide.

e. Sulfur dioxide.

f. Carbon Monoxide.

g. Maximum 5-year means (or a lesser averaging period if less than 5 years of meteorological data were used in the analyses) of the maximum modeled concentration for each year modeled.

_____ Model input and output files for SIL analyses have been provided with the application, with descriptions of the analyses associated with those files.

6.1.2 Cumulative NAAQS Impact Analyses

Results of the annual and 1-hour NO₂ cumulative NAAQS analysis demonstrate compliance with the NAAQS. The NAAQS analysis results presented below are presented using all receptors available in the SIL receptor grids (no receptors eliminated). As shown in Table 13, results do not approach the NAAQS by more than 35%. No time-and-space pairing is required to demonstrate compliance with the NAAQS.

Table 13 provides the results of Cumulative NAAQS Impact analyses. Values are adjusted to reflect the ARM (0.75 scaling factor for annual results; 0.8 scaling factor for 1-hour results).

Pollutant	Averaging Period	Modeled Design Concentration ($\mu\text{g}/\text{m}^3$)^a	Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Impact ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)
NO ₂ ^d	1-hour	83.09 ^g	33.84	116.93 ^g	188
	Annual	0.50	7.33	7.83	100
<p>a. Micrograms/cubic meter</p> <p>b. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.</p> <p>c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.</p> <p>d. Nitrogen dioxide.</p> <p>e. Sulfur dioxide.</p> <p>f. Carbon Monoxide.</p> <p>g. Maximum of 5-year means (or a lesser averaging period if less than 5 years of meteorological data were used in the analyses) of 8th highest modeled concentrations for each year modeled.</p> <p>h. Maximum of 5-year means (or a lesser averaging period if less than 5 years of meteorological data were used in the analyses) of maximum modeled concentrations for each year modeled.</p> <p>i. Maximum of 6th highest modeled concentrations for a 5-year period (or the maximum of the 2nd highest modeled concentrations if only 1 year of meteorological data are modeled).</p> <p>j. Maximum of 5-year means (or a lesser averaging period if less than 5 years of meteorological data were used in the analyses) of 4th highest modeled concentrations for each year modeled.</p> <p>k. Maximum of 2nd highest modeled concentrations for each year modeled.</p>					

_____ Model input and output files for the cumulative NAAQS impact analyses are provided with the application.

_____ If there were modeled NAAQS violations, all violations were analyzed and clearly show that the project did not significantly contribute to those modeled violations. If there were multiple violations at a given receptor, all cumulative impacts (including background) for the averaging period analyzed were ranked along with the project contribution, and the project contributions were below the applicable SIL. A table was included to show all ranked impacts above the NAAQS along with the project contribution.

6.2 TAP Impact Analyses

Table 14 provides the results for TAP impact analyses.

TAP	Averaging Period	Maximum Modeled Impact ($\mu\text{g}/\text{m}^3$)^a	AAC or AACC ($\mu\text{g}/\text{m}^3$)
Benzene	Annual	2.88×10^{-3}	0.12
Naphthalene (As PAC)	Annual	3.20×10^{-4}	0.014
Formaldehyde	Annual	4.08×10^{-4}	0.077
Arsenic	Annual	1.09×10^{-6}	0.00023
Cadmium	Annual	5.98×10^{-6}	0.00056
Nickel	Annual	1.14×10^{-5}	0.0042

^a Micrograms/cubic meter.

7.0 Quality Assurance/Control

Model inputs and results in this report have been reviewed in Trinity's Seattle office by qualified engineering consultants with air dispersion modeling experience.

Table G-1. NO₂ Annual Average Model Results

Model Year ¹	Modeled Concentration ²		UTM X ² (m)	UTM Y ² (m)	Modeled Concentration ³	Background Concentration ⁴	Model + Bkgd ⁵	Modeling Threshold ⁴	Passes Threshold?
	(µg/m ³ , NO ARM)	Calm/Missing?			(µg/m ³ , ARM)	(µg/m ³)	(µg/m ³)		
2008	0.66	--	374,834.50	4,752,883.00	0.49	7.33	7.82	100.00	YES
2009	0.60	--	374,752.30	4,752,715.70	0.45	7.33	7.78	100.00	YES
2010	0.60	--	374,752.30	4,752,715.70	0.45	7.33	7.78	100.00	YES
2011	0.67	--	374,827.00	4,752,883.00	0.50	7.33	7.83	100.00	YES
2012	0.62	--	374,827.00	4,752,883.00	0.47	7.33	7.80	100.00	YES

¹ Model results are produced using five years of publicly available meteorological data. Surface station data were obtained from KPIH, Pocatello, ID, and upper air data were obtained from KBOI, Boise, ID. Data provided and approved for use by Darrin Mehr, IDEQ, on March 18, 2016.

² Model results are found in the attached AERMOD output files, listed under source group ALL.

³ An ARM ratio of 0.75 is applied to annual results to convert the modeled NO_x concentration to NO₂.

⁴ NO₂ is subject to annual and 1-hour national ambient air quality standards (NAAQS), for which background concentrations are obtained from the Northwest AirQuest database:

Annual NAAQS	53 ppb	=	100 µg/m ³
Annual Background	3.9 ppb	=	7.33 µg/m ³

⁵ NO_x emissions in this analysis are emitted through the VCU stack and the comfort heater. Thus these sources are responsible for 100% of the impact that is not due directly to background.

Table G-2. NO₂ 1-Hour Model Results

Source Group	High Value	Modeled Concentration ¹		UTM X ¹ (m)	UTM Y ¹ (m)	Modeled Concentration ² (µg/m ³ , ARM)	Background Concentration ³ (µg/m ³)	Model + Bkgd ⁴ (µg/m ³)	SIL (µg/m ³)	NAAQS (µg/m ³) ³	Passes Threshold?
		(µg/m ³ , NO ARM)	Calm/Missing?								
ALL	H1H	112.90	--	374,717.00	4,752,885.00	90.32	--	--	7.52	--	No--See Below
ALL	H8H	103.87	--	374,717.00	4,752,885.00	83.09	33.84	116.93	--	188.00	YES

¹ All model results are obtained from the attached EPA AERMOD output file.

² An ARM ratio of 0.8 is applied to 1-hour results to convert the modeled NO_x concentration to NO₂.

³ NO₂ is subject to annual and 1-hour national ambient air quality standards (NAAQS), for which background concentrations are obtained from the Northwest AirQuest database:

1-Hour NAAQS 188 µg/m³

1-Hour Background 33.84 µg/m³

⁴ NO_x emissions in this analysis are emitted through the VCU stack and the comfort heater. Thus these sources are responsible for 100% of the impact that is not due directly to background.

Table G-3. Benzene Annual Average Model Results

Model Year¹	Modeled Concentration²		UTM X (m)	UTM Y (m)	AAC³ ($\mu\text{g}/\text{m}^3$)	Passes Threshold?
	($\mu\text{g}/\text{m}^3$)	Calm/Missing?				
2008	2.18E-03	--	374,822.60	4,752,702.80	1.20E-01	YES
2009	2.52E-03	--	374,822.60	4,752,702.80	1.20E-01	YES
2010	2.88E-03	--	374,822.60	4,752,702.80	1.20E-01	YES
2011	2.17E-03	--	374,822.60	4,752,702.80	1.20E-01	YES
2012	1.91E-03	--	374,822.60	4,752,702.80	1.20E-01	YES

¹ Model results are produced using five years of publicly available meteorological data. Surface station data were obtained from KPIH, Pocatello, ID, and upper air data were obtained from KBOI, Boise, ID. Data provided and approved for use by Darrin Mehr, IDEQ, March 18, 2016.

² Model results are found in the attached AERMOD output files, listed under source group ALL.

³ AAC values are set forth in IDAPA 58.01.01.586.

Table G-4. Naphthalene Annual Average Model Results

Model Year ¹	Modeled Concentration ²		UTM X (m)	UTM Y (m)	AAC ³ ($\mu\text{g}/\text{m}^3$)	Passes Threshold?
	($\mu\text{g}/\text{m}^3$)	Calm/Missing?				
2008	2.40E-04	--	374,822.60	4,752,702.80	1.40E-02	YES
2009	2.80E-04	--	374,822.60	4,752,702.80	1.40E-02	YES
2010	3.20E-04	--	374,822.60	4,752,702.80	1.40E-02	YES
2011	2.40E-04	--	374,814.50	4,752,703.00	1.40E-02	YES
2012	2.10E-04	--	374,822.60	4,752,702.80	1.40E-02	YES

¹ Model results are produced using five years of publicly available meteorological data. Surface station data were obtained from KPIH, Pocatello, ID, and upper air data were obtained from KBOI, Boise, ID. Data provided and approved for use by Darrin Mehr, IDEQ, March 18, 2016.

² Model results are found in the attached AERMOD output files, listed under source group ALL.

³ AAC values are set forth in IDAPA 58.01.01.586.

Table G-5. Tesoro Boise Annual Modeling Results - Toxic Air Pollutants from Combustion

Year ^a	Toxic Air Pollutant	Averaging Period	Total Model Impact ^b (µg/m ³)	AAC ^c (µg/m ³)	Modeled Rate Below AAC?	Total Impact Percent of AAC
Maximum	Formaldehyde	Year	4.08E-04	7.70E-02	Yes	0.5%
2008		Year	3.18E-04	7.70E-02	Yes	0.4%
2009		Year	4.08E-04	7.70E-02	Yes	0.5%
2010		Year	4.01E-04	7.70E-02	Yes	0.5%
2011		Year	3.46E-04	7.70E-02	Yes	0.4%
2012		Year	3.35E-04	7.70E-02	Yes	0.4%
Maximum		Arsenic	Year	1.09E-06	2.30E-04	Yes
2008	Year		8.47E-07	2.30E-04	Yes	0.4%
2009	Year		1.09E-06	2.30E-04	Yes	0.5%
2010	Year		1.07E-06	2.30E-04	Yes	0.5%
2011	Year		9.24E-07	2.30E-04	Yes	0.4%
2012	Year		8.92E-07	2.30E-04	Yes	0.4%
Maximum	Cadmium		Year	5.98E-06	5.60E-04	Yes
2008		Year	4.66E-06	5.60E-04	Yes	0.8%
2009		Year	5.98E-06	5.60E-04	Yes	1.1%
2010		Year	5.88E-06	5.60E-04	Yes	1.1%
2011		Year	5.08E-06	5.60E-04	Yes	0.9%
2012		Year	4.91E-06	5.60E-04	Yes	0.9%
Maximum		Nickel	Year	1.14E-05	4.20E-03	Yes
2008	Year		8.90E-06	4.20E-03	Yes	0.2%
2009	Year		1.14E-05	4.20E-03	Yes	0.3%
2010	Year		1.12E-05	4.20E-03	Yes	0.3%
2011	Year		9.70E-06	4.20E-03	Yes	0.2%
2012	Year		9.37E-06	4.20E-03	Yes	0.2%

^a Model results are produced using five years of publicly available meteorological data. Surface station data were obtained from KPIH, Pocatello, ID, and upper air data were obtained from KBOI, Boise, ID. Data provided and approved for use by Darrin Mehr, IDEQ, March 18, 2016.

^b Model results are found in the attached AERMOD output files, listed under source group ALL.

^c AAC values are set forth in IDAPA 58.01.01.586.

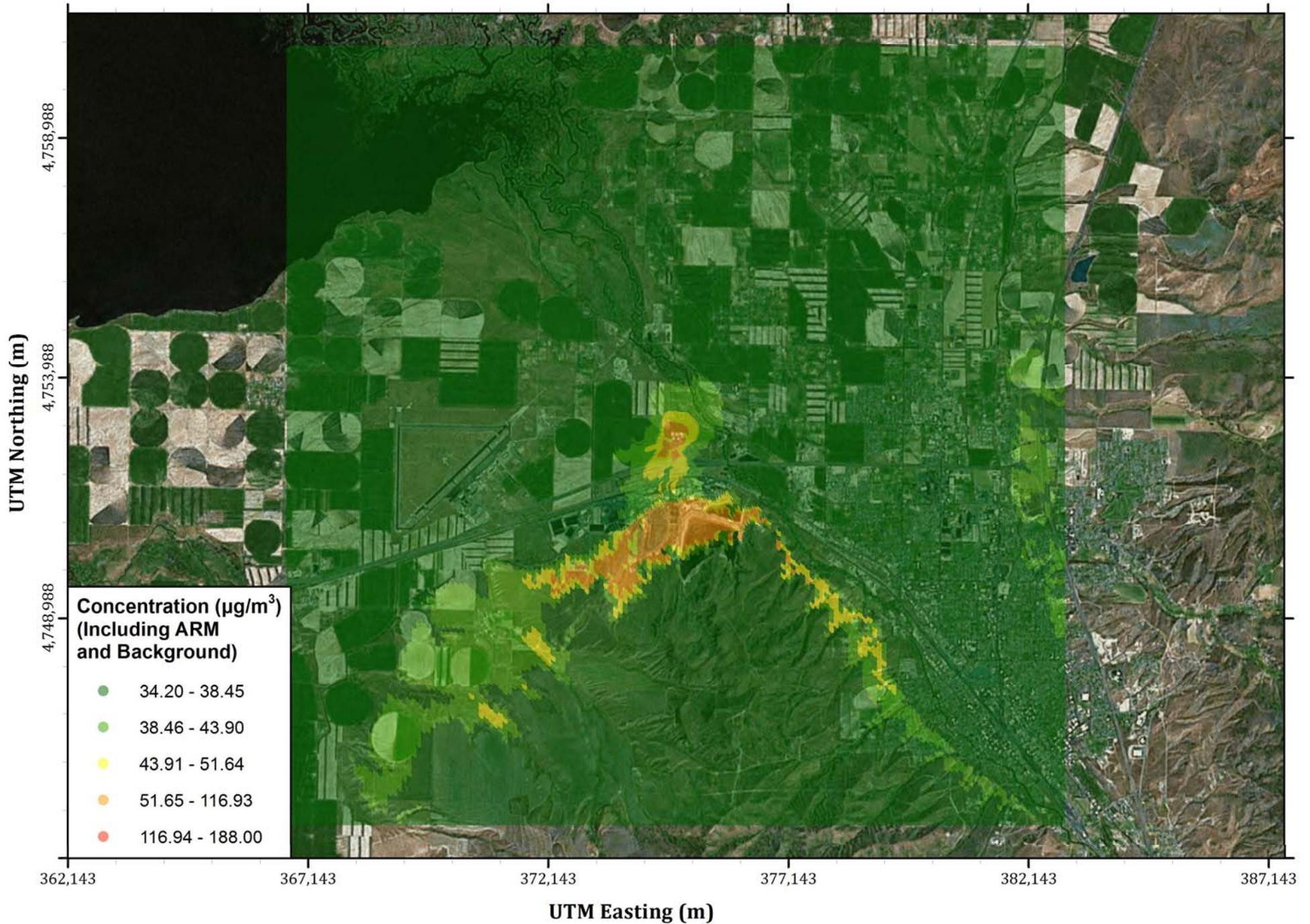
Table G-6. Model Concentration Calculations for Combustion Toxic Air Pollutants

Year^a	Averaging Period	Model Impact (Based on Nominal VCU Emission Rate)^b (µg/m³)	VCU, Formaldehyde Emission Rate (g/s)	Total Formaldehyde Model Impact (µg/m³)	VCU, Arsenic Emission Rate (g/s)	Total Arsenic Model Impact (µg/m³)	VCU, Cadmium Emission Rate (g/s)	Total Cadmium Model Impact (µg/m³)	VCU, Nickel Emission Rate (g/s)	Total Nickel Model Impact (µg/m³)
Maximum	Year	2.88E+01	1.417E-05	4.08E-04	3.778E-08	1.087E-06	2.078E-07	5.978E-06	3.967E-07	1.141E-05
2008	Year	2.24E+01	1.417E-05	3.18E-04	3.778E-08	8.474E-07	2.078E-07	4.661E-06	3.967E-07	8.898E-06
2009	Year	2.88E+01	1.417E-05	4.08E-04	3.778E-08	1.087E-06	2.078E-07	5.978E-06	3.967E-07	1.141E-05
2010	Year	2.83E+01	1.417E-05	4.01E-04	3.778E-08	1.069E-06	2.078E-07	5.881E-06	3.967E-07	1.123E-05
2011	Year	2.44E+01	1.417E-05	3.46E-04	3.778E-08	9.238E-07	2.078E-07	5.081E-06	3.967E-07	9.700E-06
2012	Year	2.36E+01	1.417E-05	3.35E-04	3.778E-08	8.920E-07	2.078E-07	4.906E-06	3.967E-07	9.366E-06

^a Model results are produced using five years of publicly available meteorological data. Surface station data were obtained from KPIH, Pocatello, ID, and upper air data were obtained from KBOI, Boise, ID. Data provided and approved for use by Darrin Mehr, IDEQ, March 18, 2016.

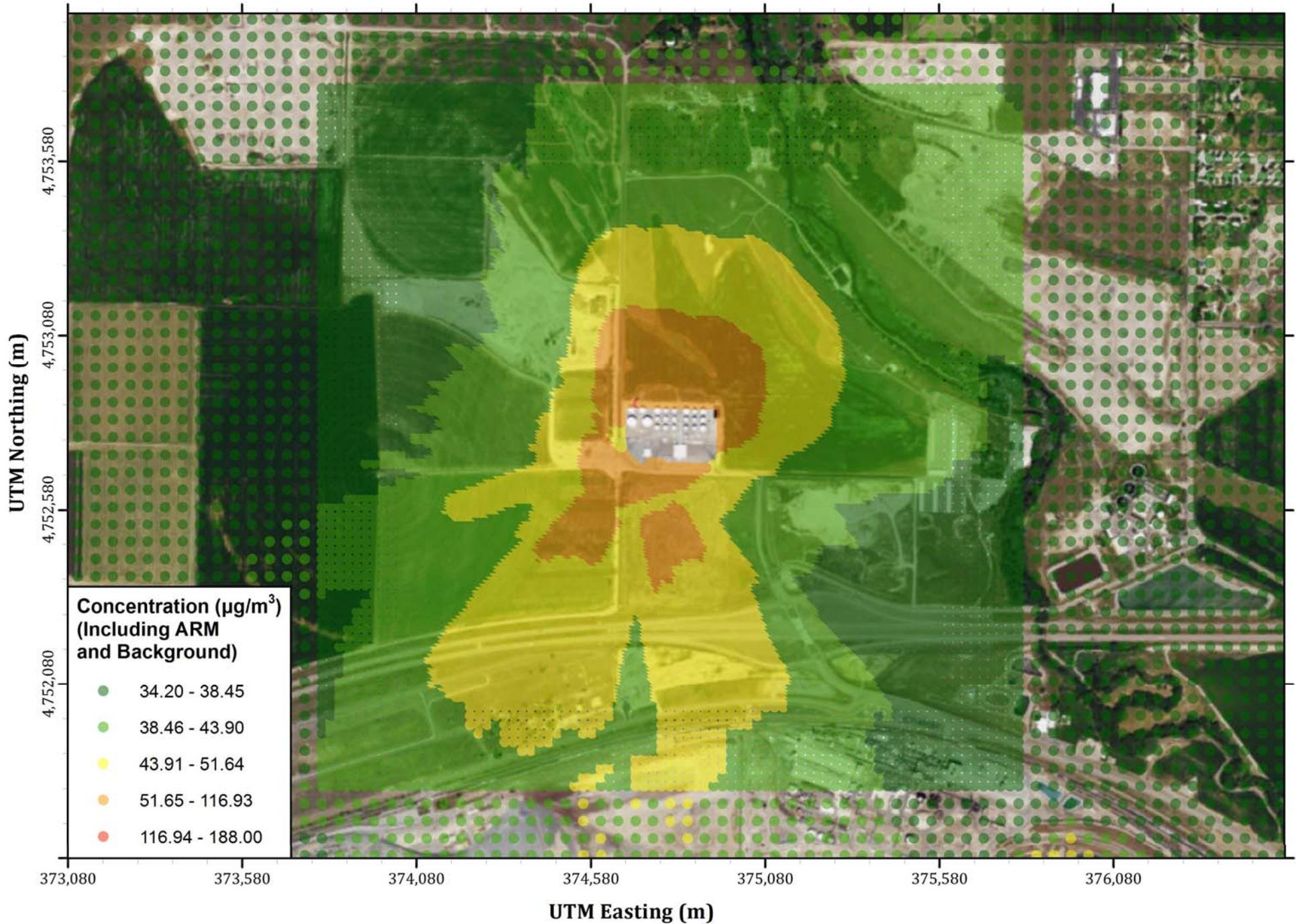
^b Model results are found in the attached AERMOD output files, listed under source group ALL in the combustion TAP model files.

Figure G-1 - NO₂ 1-Hour Averaging Period
Cumulative Impacts for NAAQS Comparison
2008 - 2012 Meteorological Years



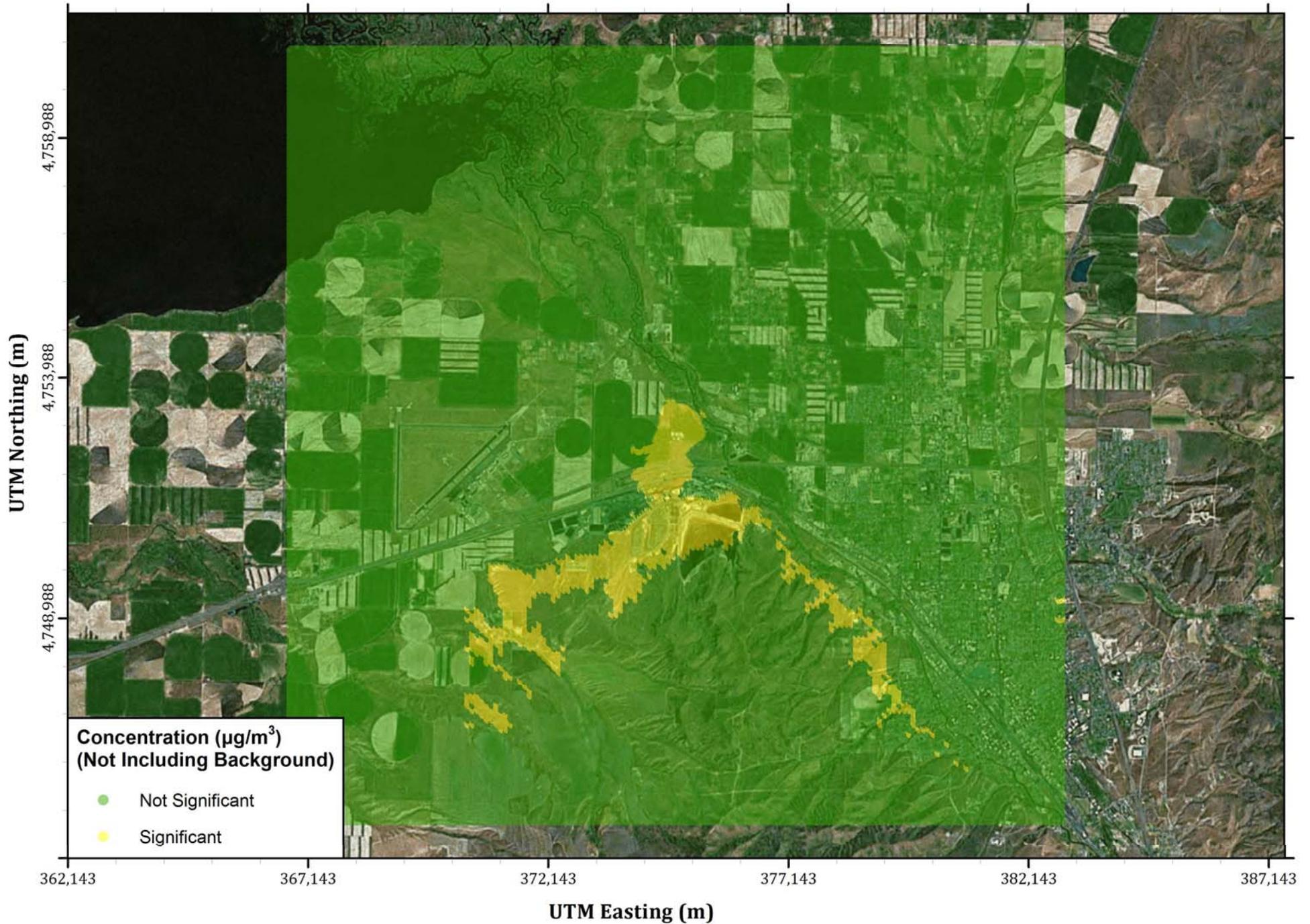
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure G-2 - NO₂ 1-Hour Averaging Period
Cumulative Impacts for NAAQS Comparison
2008 - 2012 Meteorological Years



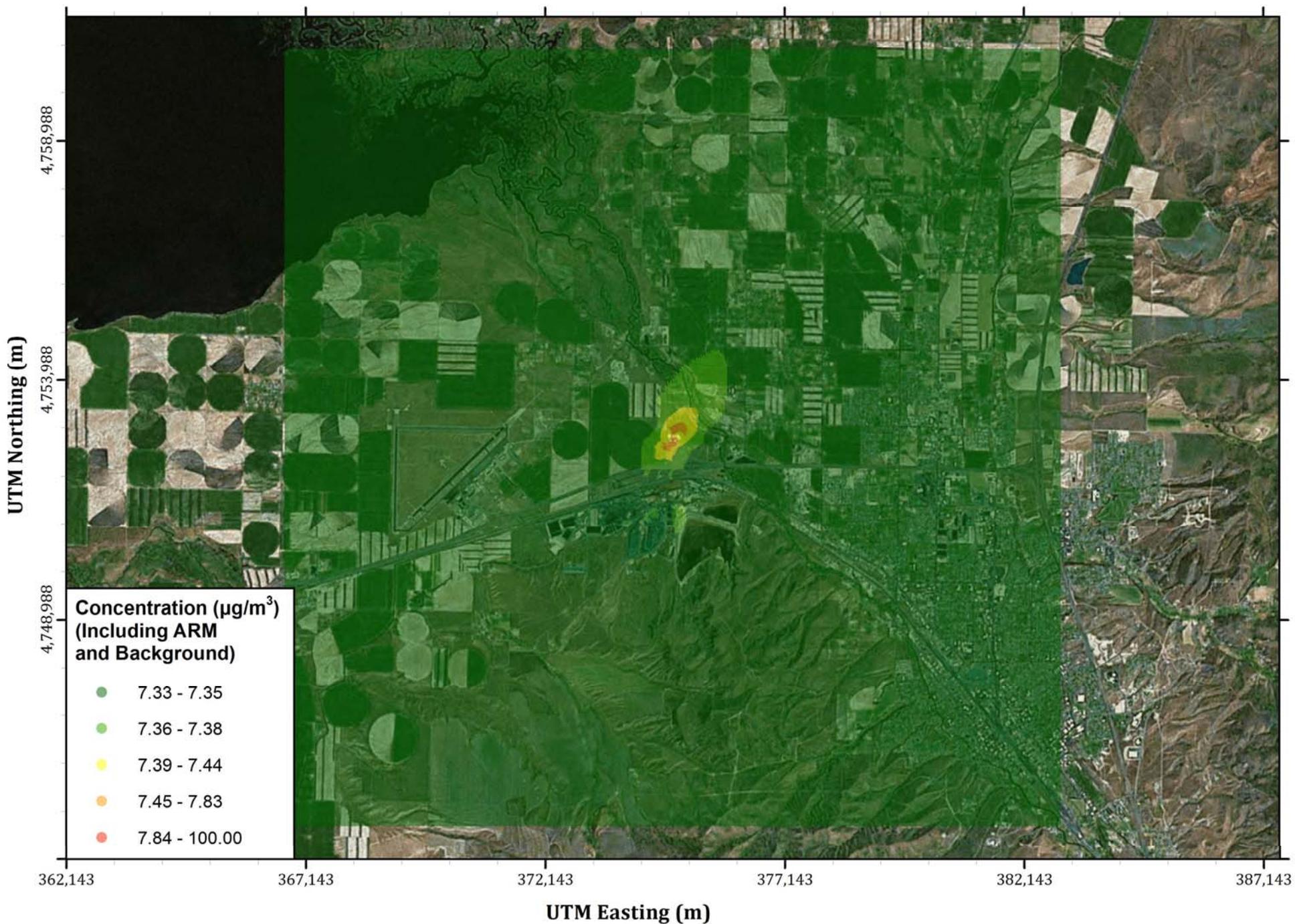
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure G-3 - NO₂ 1-Hour Averaging Period
Significance Area for SIL Analysis
2008 -2012 Meteorological Years



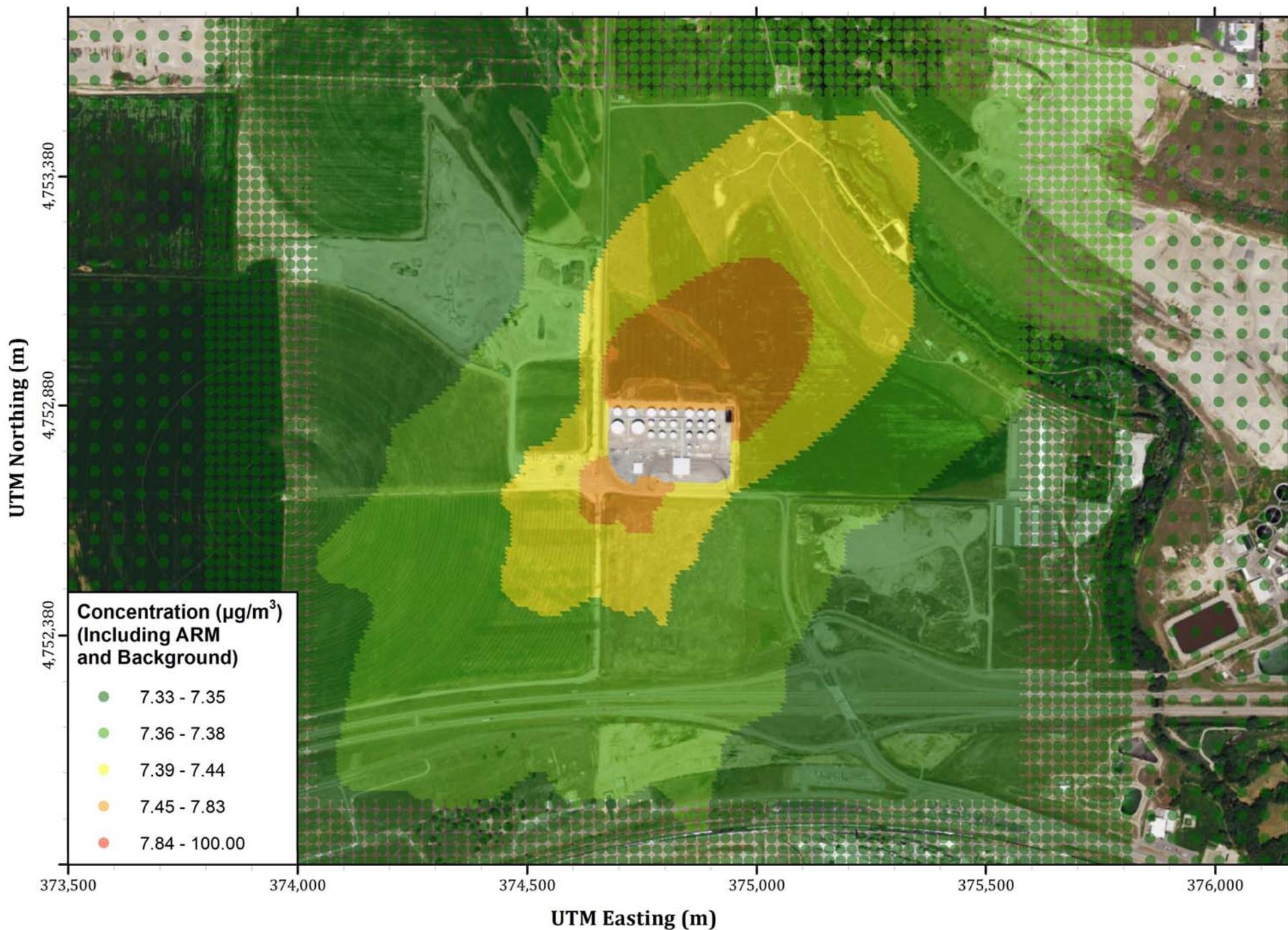
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure G-4 - NO₂ Annual Averaging Period
2011 Meteorological Year



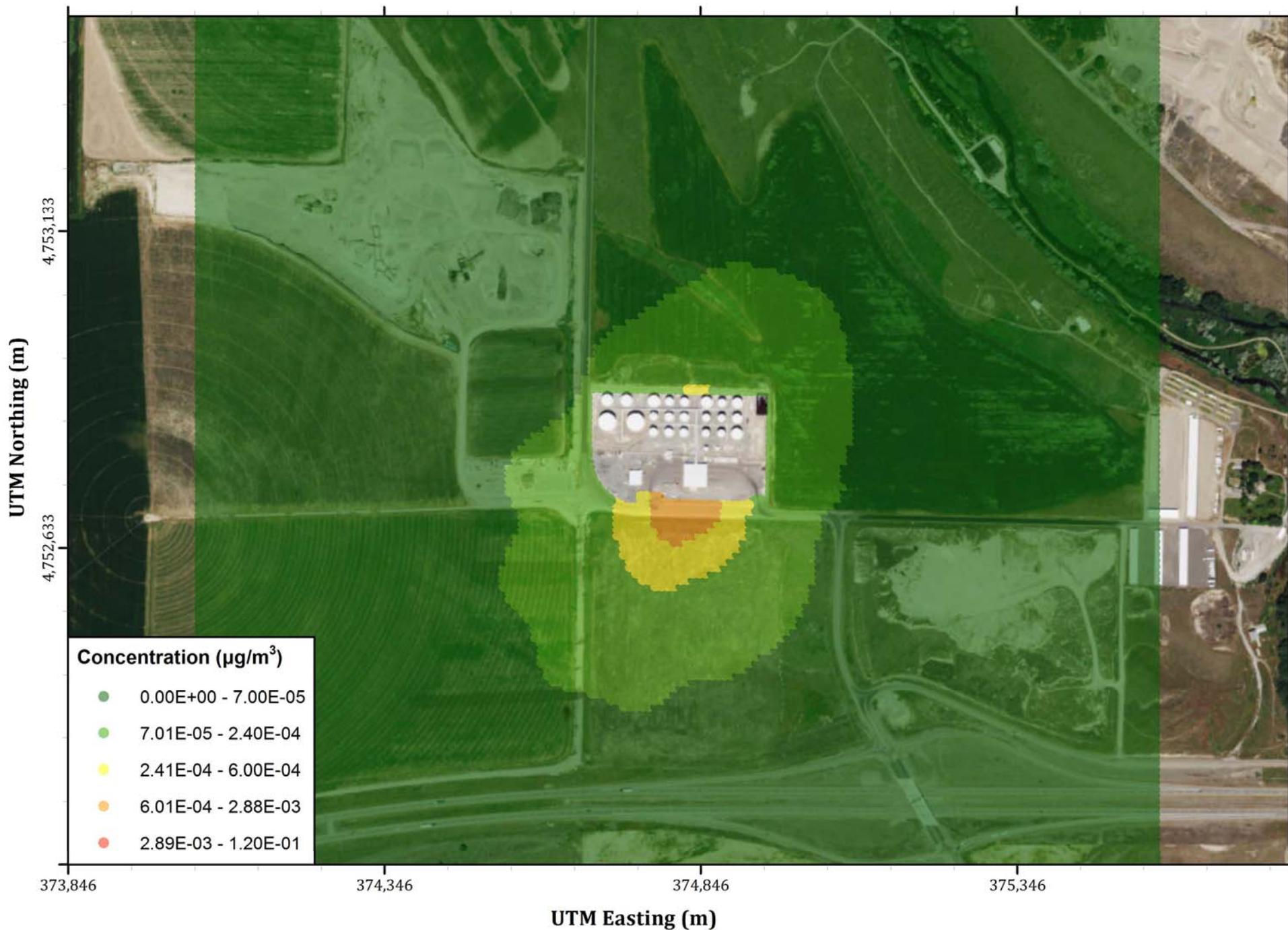
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure G-5 - NO₂ Annual Averaging Period
2011 Meteorological Year



All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure G-6 - Benzene Annual Averaging Period
2010 Meteorological Year



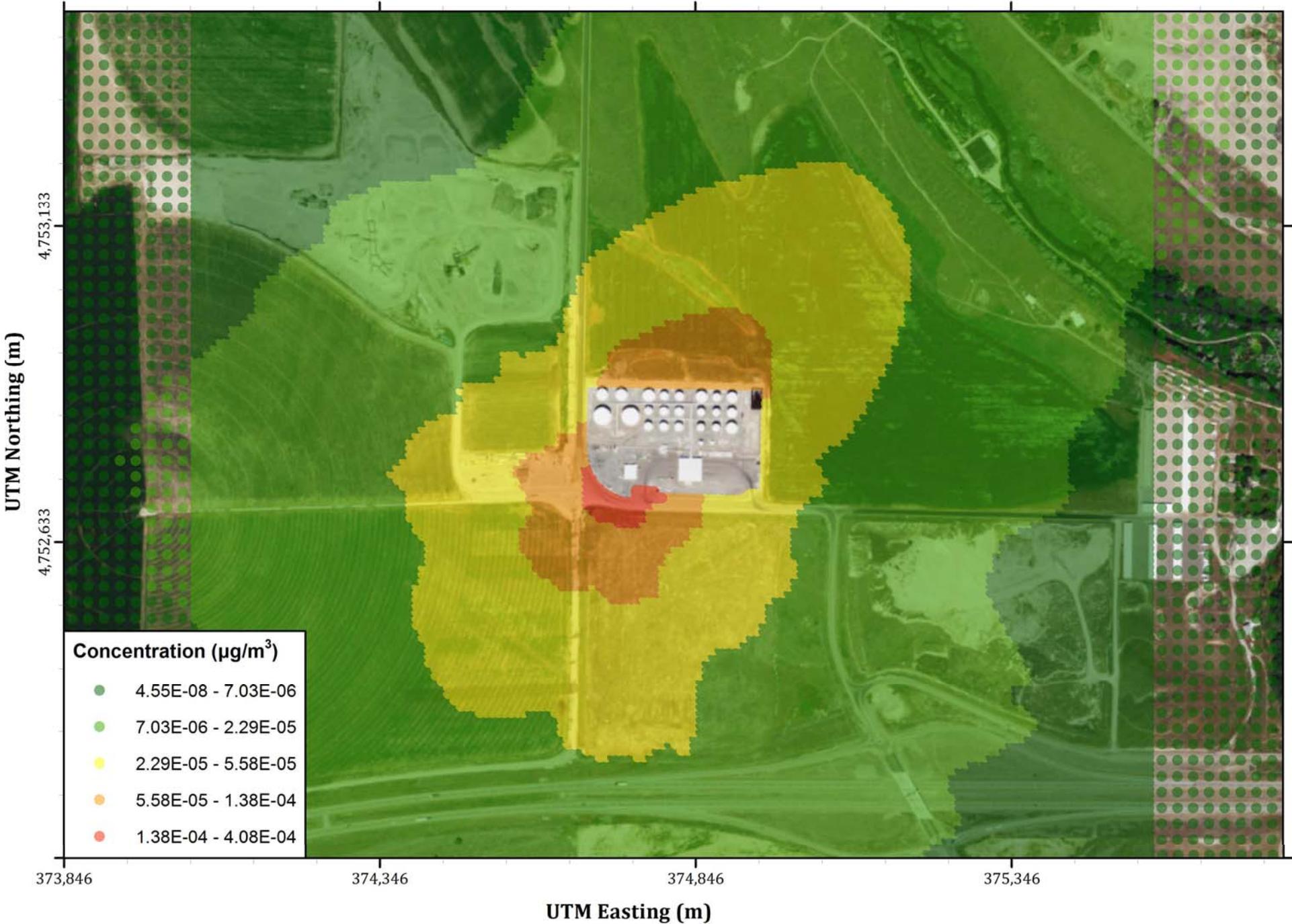
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure G-7 - Naphthalene Annual Averaging Period
2010 Meteorological Year



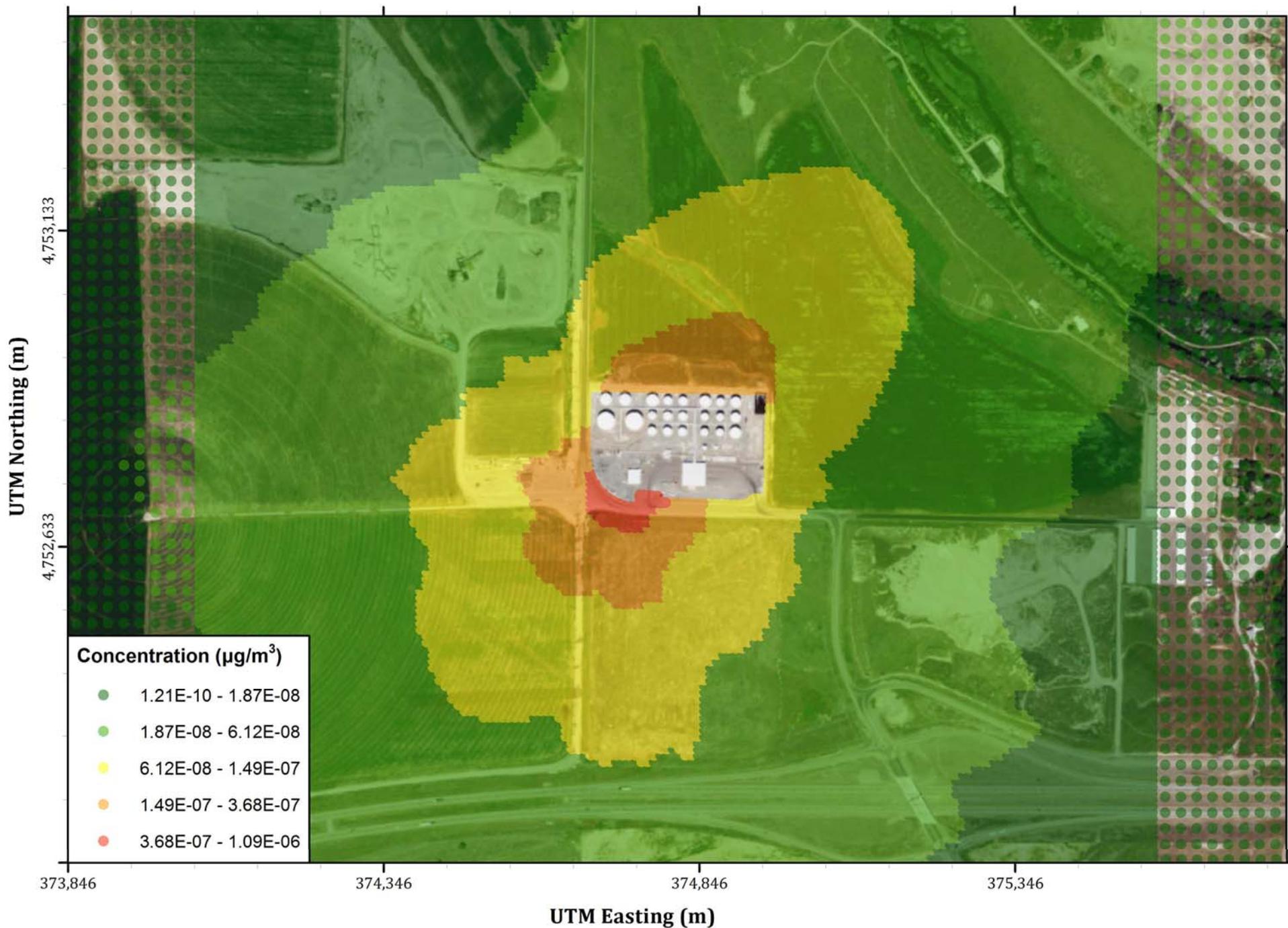
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure G-8 - Formaldehyde Annual Averaging Period
2009 Meteorological Year



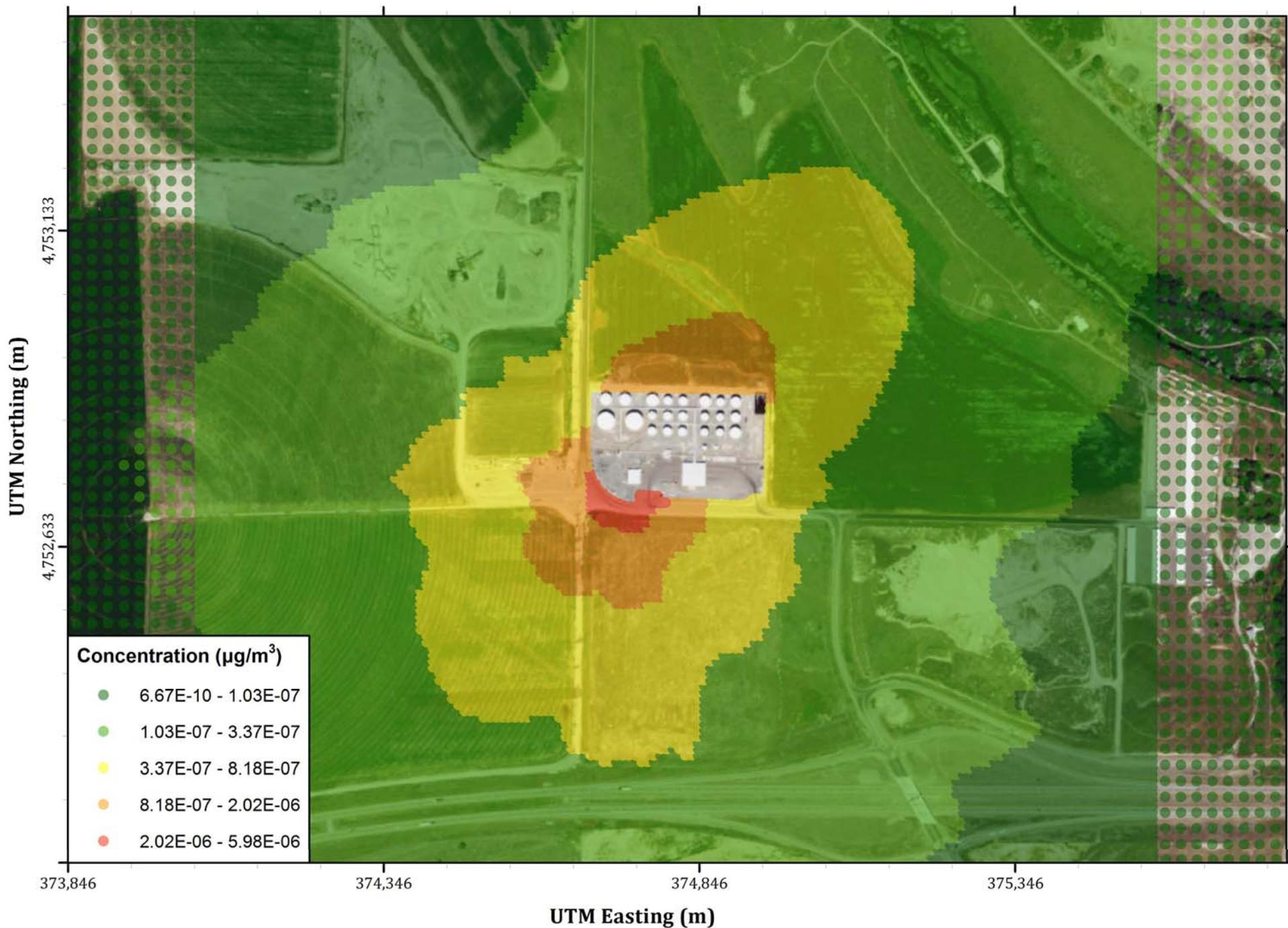
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure G-9 - Arsenic Annual Averaging Period
2009 Meteorological Year



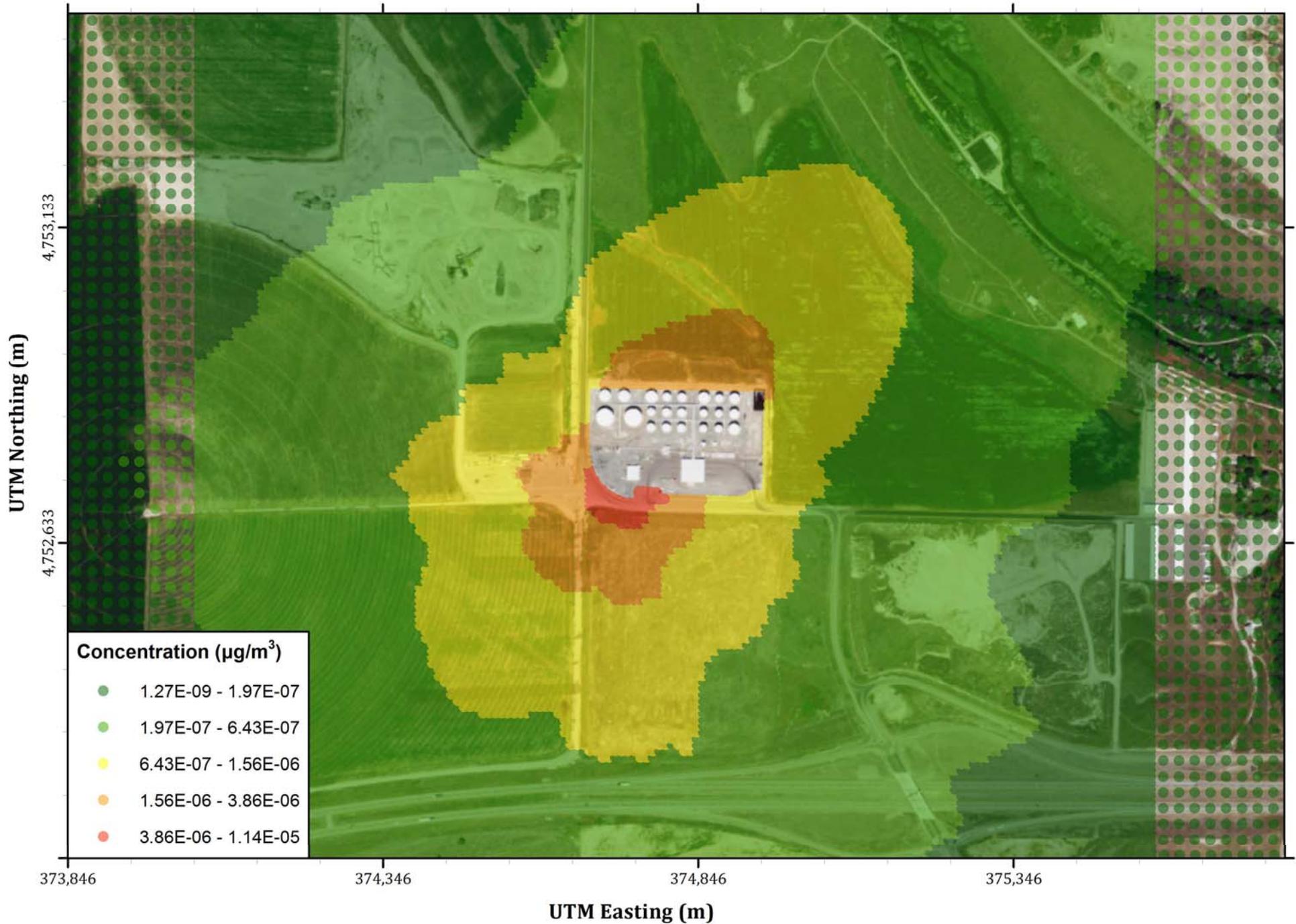
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure G-10 - Cadmium Annual Averaging Period
2009 Meteorological Year



All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure G-11 - Nickel Annual Averaging Period
2009 Meteorological Year



All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

PERFORMANCE TEST REPORT

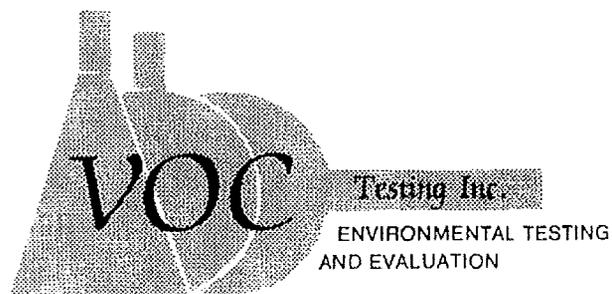
JOHN ZINK ENCLOSED GROUND FLARE
INSTALLED AT THE CHEVRON PIPELINE
BULK GASOLINE TERMINAL
IN POCA TELLO, IDAHO

TEST DATE: NOVEMBER 9, 2001

TEST TIME: 6:25 A.M. TO 12:25 P.M.

Prepared for:

CHEVRON PIPELINE COMPANY
1189 TANK FARM ROAD
POCA TELLO, IDAHO 83201



1.0 Introduction

On November 9, 2001 personnel of VOC Testing, Inc. conducted a performance test of the John Zink enclosed ground flare emission control system installed at the Chevron Pipeline Company gasoline terminal in Pocatello, Idaho. The testing entailed the simultaneous sampling of the inlet and outlet hydrocarbon concentrations, inlet volume, temperature, and pressure, and outlet carbon monoxide and carbon dioxide of the vapor control system during tank truck loading. In addition the output from the terminal's temperature thermocouple on the enclosed ground flare stack was recorded during the test. The purpose of the testing was to determine the hydrocarbon mass emission rate of the enclosed ground flare, and to correlate this mass emission rate with the stack temperature.

The system was tested for six hours with more than 80,000 gallons loaded during the test with the enclosed ground flare receiving vapors from tank trucks being loaded.

This report presents the results of the performance test, and describes the equipment and procedures used.

2.0 Test Results

The results of the performance test conducted on November 9, 2001 at the Chevron Pipeline bulk gasoline terminal in Pocatello, Idaho are summarized in Table 1.

The raw data and calculations supporting these results can be found in Appendix A and B.

Table 1

Efficiency and Mass Emission Rate Determination

Test Time	6:25 a.m. - 12:25 p.m.
Volume of Gasoline Loaded	300,978 gallons (1,139,202 l.)
Volume of Distillate Loaded	150,185 gallons (568,450 L.)
Thermal Oxidizer Inlet Volume	52,452 SCF (1,485 Nm ³)
Thermal Oxidizer Exhaust Volume	1,737,594 SCF (49,209.7 Nm ³)
Average Inlet Concentration (THC)	8.1 % as C ₁
Average Outlet Concentration (THC)	65.3 ppmv as C ₁
Outlet Mass Emission (THC)	9.19 lbs. (4.17 kg)
Inlet Mass (THC)	490.2 lbs. (222.4 kg)
Hydrocarbon Removal Efficiency	98 %
Mass Emission Rate	0.031 lb/1000 gal. (3.6 mg/l)
Average Stack Temperature	607 degrees F

3.0 Process Description

The John Zink enclosed ground flare installed at the Chevron Pipeline Company gasoline terminal in Pocatello, Idaho removes hydrocarbons from the air/vapor mixture displaced during gasoline truck loading by thermal oxidation at high temperatures. The enclosed ground flare receives vapors directly from tank trucks being loaded.

The John Zink enclosed ground flare tested is a vertical cylindrical combustion chamber with refractory insulation and steel innerlining. The starting sequence begins with a pre-purge in which the air blower purges the combustion chamber for several minutes to remove any residual hydrocarbons. The pilot light then comes on and vapors are fed to the burner through a detonation arrestor by a vapor blower.

The enclosed ground flare has a thermocouple installed in the stack approximately 20 feet up the stack. The thermocouple is read during each loading event by the terminal computer system and the data is stored along with the loading data. The computerized data acquisition system provides an average temperature for each loading event corresponding the bill of lading for that loading event. This stack gas temperature monitoring system is used as the continuous emission monitoring system in accordance with Subpart R, 40CFR63.427. These sections of the Federal Register can be found in Appendix C.

4.0 Testing Procedures

Inlet Volume and Hydrocarbon Monitoring

An eight inch Rockwell T-60 turbine meter was inserted into the piping just before and thermal oxidizing chamber to measure the volume of the vapor going into the combustion chamber. The temperature of the inlet vapor mixture was measured with a type K thermocouple placed onto the surface of the meter. A continuous sample of the inlet vapor was drawn with a 30' foot teflon sample line to the analyzer. The inlet gas volume was monitored in accordance with EPA Method 2a, "Direct Measurement of Gas Volume Through Pipes and Small Ducts."

The inlet gas sample was analyzed continuously with a Horiba PIR2000 hydrocarbon analyzer equipped with a nondispersive infrared detector. The analyzer was calibrated with certified standard gases of propane in nitrogen of 10, 25 and 50%. The inlet gas analysis of hydrocarbon concentration was performed in accordance with EPA Method 25B "Determination of Total Gaseous Organic Concentration Using a Nondispersive Infrared Analyzer". This method and other methods cited are included in Appendix C.

Outlet Sample Continuous Monitoring for Hydrocarbons, Carbon Monoxide, and Carbon Dioxide

The exhaust gas of the enclosed ground flare was continuously monitored for carbon monoxide, carbon dioxide, and total hydrocarbons. The sample was taken through a stainless steel probe positioned at the center of the stack. The sample for the CO and CO₂ was drawn through 30 feet 1/4" teflon tubing to a condenser system to remove moisture from the sample. The condenser system consisted of three modified Greenburg-Smith impingers in series in an ice water bath. The sample leaving the drying system was pulled through 3 feet of 1/4" teflon tubing by a teflon coated diaphragm pump to a manifold from which a slipstream was drawn for each of the two continuous analyzers. The sample for the exhaust hydrocarbon analyzer was drawn through 30 feet of heated Teflon sampling line with a heated, Teflon lined, diaphragm pump.

Carbon monoxide and carbon dioxide concentration were analyzed using Horiba PIR 2000 non-dispersive infrared analyzers. The analyzers were calibrated at the beginning and end of the test with certified standards of CO and CO₂ in nitrogen. The CO

concentrations used were 101, 201, and 416 ppm. The CO₂ standard concentrations used were 4, 7 and 13%. The carbon monoxide and carbon dioxide concentrations were recorded on a strip chart and five minute averages were recorded.

The outlet hydrocarbon gas sample was analyzed continuously with a Téledyne Model 302 total hydrocarbon analyzer equipped with a flame ionization detector. The analyzer was calibrated with certified standard gases of propane in nitrogen of 101, 199, 415 and 884 ppm. The hydrocarbon analysis was performed in accordance with EPA Method 25a.

Backpressure and Leak Detection

The vapor recovery system backpressure was checked at each loading position during the test with a Camlock adapter fitted with a 0-25 inch water magnehelic gauge which was placed on the vapor return hose during filling of the tank throughout the fill and the maximum, minimum and five minute interval backpressures were recorded for at least one fill for each flame arrestor.

During the test the vapor recovery system piping, flanges and valves were leak tested with a Bacharach Model 301 explosimeter which was calibrated with 2.5% methane in air. Any leaks found were noted. The leaks were detected to the level of the 500 ppmv as methane. Leak detection data is included in Appendix A.

At the beginning of the test all loading was halted for approximately 15 minutes in order to take the totalizer readings from the product dispensers. This procedure was also followed at the end of the test.

Table E-1a. Modeled Point Source Parameters for VCU

Point Sources	Description	Source	UTM East ^a (m)	UTM North ^a (m)	Elevation ^b (m)	Release Height ^c (m)	Release Temp ^d (K)	Velocity ^e (m/s)	Diameter ^c (m)	Modeled Annual Emissions ^f				
										NO _x Emissions (g/s)		Naphthalene (g/s)	Benzene (g/s)	Combustion Byproducts ^g (g/s)
										Short-Term	Annual			
VCU	Stack Emissions from VCU	POINT	374718	4752779	1350.93	10.67	592.59	2.28	2.44	1.133E+00	9.299E-02	1.875E-06	2.530E-05	1.000E+00

^a Coordinates for point source are given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.

^b Source elevations based on output from EPA's AERMAP elevation software, version 11103. AERMAP computed these elevations based on seamless NED data covering the area around the site. Data obtained from the United States Geological Survey via the MRLC Consortium seamless server.

^c Release height and stack diameter based on measurements at the Pocatello site.

^d Online temperature data is not recorded from this stack. The temperature estimate is based on a source test (November 9, 2001) for the VCU.

607 °F

^e Stack exit velocity calculated using stoichiometric combustion calculations. See Tables B-3a through B-3c for details.

^f Modeled sources are representative of emissions in Table C-17a.

^g Combustion byproducts include formaldehyde, arsenic, cadmium, and nickel. The emission rates of these pollutants are proportional, so they are modeled assuming a nominal emission rate of 1 g/s for the VCU. Model results are scaled based on the emission rates of each pollutant.

Table E-1b. Modeled Product Loading Sources

Volume Sources	Description	Source	UTM East ^a (m)	UTM North ^a (m)	Elevation ^b (m)	Release Height ^c (m)	Initial Lateral Dimension ^c (m)	Initial Vertical Dimension ^c (m)	Modeled Annual Emissions ^d	
									Benzene (g/s)	Naphthalene (g/s)
Loading Rack	Center of Loading Rack	-	374836	4752748	-	-	-	-	0.000E+00	4.971E-07
BAY1_1	Fugitive Emissions from Loading Rack	VOLUME	374838	4752760	1350.15	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY1_2	Fugitive Emissions from Loading Rack	VOLUME	374836	4752760	1350.17	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY1_3	Fugitive Emissions from Loading Rack	VOLUME	374834	4752760	1350.19	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY2_1	Fugitive Emissions from Loading Rack	VOLUME	374838	4752750	1350.26	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY2_2	Fugitive Emissions from Loading Rack	VOLUME	374836	4752750	1350.28	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY2_3	Fugitive Emissions from Loading Rack	VOLUME	374834	4752750	1350.31	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY3_1	Fugitive Emissions from Loading Rack	VOLUME	374838	4752740	1350.41	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY3_2	Fugitive Emissions from Loading Rack	VOLUME	374836	4752740	1350.41	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY3_3	Fugitive Emissions from Loading Rack	VOLUME	374834	4752740	1350.42	1.63	1.13	1.51	0.000E+00	5.524E-08
BAYT_1	Fugitive Emissions from Transmix Bay	VOLUME	374838	4752732	1350.49	1.63	1.13	1.51	8.268E-07	7.471E-10
BAYT_2	Fugitive Emissions from Transmix Bay	VOLUME	374836	4752732	1350.49	1.63	1.13	1.51	8.268E-07	7.471E-10
BAYT_3	Fugitive Emissions from Transmix Bay	VOLUME	374834	4752732	1350.5	1.63	1.13	1.51	8.268E-07	7.471E-10

^a Coordinates for the loading rack are given in UTM Zone 12 with NAD 1983 projection. The coordinates in the first row are the center of the rack, in the middle bay. Coordinates were established using aerial imagery and attached plot plans of the facility. Coordinates of the individual volume sources are based on the three product loading bays and the single transmix loading / ethanol offloading bay at the loading rack. Based on the plot plans and aerial imagery, the centerlines of each bay are 10 m apart. The bays run east to west. Therefore, Bay 1 is 31 ft north of Bay 2, and Bay 3 is 31 ft south. With regard to the number and spacing of volume sources: each tank truck is approximately 8.0 feet wide. This width is used to define volume source spacing as described in EPA's AERMOD user guide, Table 3-1, and EPA's 1995 ISCST3 model user guide, Figure 1-8a. According to this figure, each volume source is to be spaced 8.0 feet apart. Each truck is approximately 23 ft long. 23 ft / 8.0 ft = 2.875, so three volume sources are used to represent each bay. The volume sources are located with reference to the center of the loading rack: one 8 ft west of the centerline, one located on the centerline, and one 8 ft east of the centerline for each bay.

Length of truck + trailer:	7.01	m	=	23.0	ft
Width of truck:	2.44	m	=	8.0	ft
Number of volume sources per bay:	3				
Height of truck:	3.25	m	=	10.67	ft
Volume source release height:	1.6	m	=	5.3	ft

^b Source elevations based on output from EPA's AERMAP elevation software, version 11103. AERMAP computed these elevations based on seamless NED data covering the area around the site. Data obtained from the United States Geological Survey via the MRLC Consortium seamless server,

^c Volume source initial vertical dimensions are based on the estimated height of a gasoline tank truck. The tank truck height is set to 3.25 meters, and the central release height is taken to be the middle of the truck. Volume source initial lateral dimension is calculated as the truck width / 2.15, as described in footnote a, for adjacent volume sources forming a line source, in accordance with the State of Idaho Modeling Guideline. Each volume source in the adjacent sources is identical.

^d Emission rates of each species are calculated by equally apportioning the loading rack emissions.

Table E-1c. Modeled Furnace Source

Volume Sources	Description	Source	UTM East ^a (m)	UTM North ^a (m)	Elevation ^b (m)	Release Height ^c (m)	Release Temp ^d (K)	Velocity ^e (m/s)	Diameter ^c (m)	Modeled Annual Emissions				
										NO _x Emissions (g/s)		Benzene (g/s)	Naphthalene (g/s)	Combustion Byproducts ^f (g/s)
										Short-Term	Annual			
FURN	Comfort heater (natural gas)	POINT	374745	4752746	1351.34	4.27	0	1.92	7.62E-02	1.297E-03	1.297E-03	2.724E-08	7.912E-09	6.865E-02

^a Coordinates for the furnace stack source are given in UTM Zone 12 with NAD 1983 projection.

^b Source elevations based on output from EPA's AERMAP elevation software, version 11103. AERMAP computed these elevations based on seamless NED data covering the area around the site.

^c Release height and stack diameter based on on-site measurements (November 12, 2015).

^d Release temperature not specified in the heater specifications, so a conservative ambient temperature setting is used. This temperature setting is represented with a "0" in the input file for EPA's AERMOD model.

^e Velocity for the furnace is calculated below:

Heater Capacity	0.105 MMBtu/hr
Exhaust Factor	10,610 wscf/MMBtu (EPA Method 19)
Exhaust Gas	1,114 wscf/hr
	31.55 scm/hr
Stack Diameter	0.076 m
Stack Cross-Sectional Area	0.0046 sq. m
Stack Exit Velocity	1.92 m/s

^f Combustion byproducts include formaldehyde, arsenic, cadmium, and nickel. The emission rates of these pollutants are proportional, so they are modeled assuming a nominal emission rate of 1 g/s for the VCU. The modeled furnace nominal emission rate is calculated by dividing the pollutant-specific furnace emission rate by the VCU emission rate. Model results are scaled based on the emission rates of each pollutant.

Table E-1d. Coordinates Used to Obtain Elevation Data

Location	UTM East ^a (m)	UTM North ^a (m)	Longitude	Latitude
Center of Facility	374809.5	4752788	-112.53386	42.91744
Point NE of Center	394809.5	4772788	-112.29265	43.10052
Point SW of Center	354809.5	4732788	-112.77364	42.73388

^a Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. A terrain data range of +/- 10 km from the facility center is used.

Table E-2. Coordinates of Property Fenceline

Location	UTM East^a (m)	UTM North^a (m)
NW Corner	374667	4752886
NE Corner	374959	4752880
Point 1	374956	4752709
Point 2	374935	4752710
Point 3	374919	4752699
Point 4	374784	4752703
Point 5	374780	4752714
Point 6	374752	4752715
Point 7	374751	4752696
Point 8	374727	4752697
Point 9	374703	4752708
Point 10	374686	4752724
Point 11	374674	4752744
Point 12	374668	4752763
Point 13	374665	4752785

^a Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.

Table E-3a. Vertical Tank Coordinates and Dimensions

Building Name	Center UTM East ^a (m)	Center UTM North ^a (m)	Shell Height (ft)	Diameter (ft)	Diameter (m)	Radius (ft)
TANK901	374772	4752814	39.34	42.53	12.96	21.26
TANK902	374796	4752813	39.65	42.55	12.97	21.27
TANK903	374819	4752812	39.40	42.54	12.97	21.27
TANK904	374772	4752838	40.02	42.50	12.95	21.25
TANK905	374797	4752838	39.20	42.51	12.96	21.25
TANK906	374820	4752837	39.37	42.52	12.96	21.26
TANK907	374797	4752862	39.57	42.53	12.96	21.27
TANK908	374821	4752862	39.38	42.51	12.96	21.25
TANK909	374855	4752812	48.01	39.99	12.19	20.00
TANK910	374880	4752812	48.00	39.98	12.19	19.99
TANK911	374903	4752810	47.62	56.53	17.23	28.27
TANK912	374856	4752837	48.02	39.98	12.19	19.99
TANK913	374880	4752836	48.00	39.98	12.19	19.99
TANK914	374904	4752835	47.82	48.04	14.64	24.02
TANK915	374881	4752861	47.47	40.02	12.20	20.01
TANK916	374905	4752860	47.43	52.52	16.01	26.26
TANK917	374773	4752863	39.71	60.09	18.31	30.04
TANK918	374856	4752861	47.52	56.53	17.23	28.27
TANK919	374729	4752864	40.00	60.07	18.31	30.04
TANK920	374699	4752865	39.45	60.08	18.31	30.04
TANK921	374743	4752829	47.92	90.02	27.44	45.01
TANK922	374699	4752829	47.99	90.01	27.43	45.00
TANK930	374854	4752788	24.00	21.24	6.47	10.62
TANKA100	374873	4752789	16.00	15.00	4.57	7.50

^a Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.

Table E-3b. Horizontal Tank Coordinates and Dimensions

Building Name	NE Corner UTM East ^a (m)	NE Corner UTM North ^a (m)	Height (ft)	X Length (ft)	Y Length (ft)	Angle
TANKA101	374869	4752774	8.00	8.00	16.00	180
TANKA102	374875	4752774	6.00	6.00	19.00	180
TANKA105	374888	4752772	5.30	5.30	12.00	180
TANKA107	374894	4752772	3.79	3.79	12.00	180
TANKA108	374899	4752775	7.75	7.75	22.00	180
TANKA110	374903	4752773	7.50	7.50	12.00	180
TANKA112	374880	4752774	8.00	8.00	17.42	180
TANKA113	374884	4752774	7.50	7.50	22.00	180
TANKA114	374865	4752773	8.00	8.00	6.00	180

^a Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.

Table E-3c. Building Coordinates and Dimensions

Building Name	NE Corner UTM East ^a (m)	NE Corner UTM North ^a (m)	Height (ft)	X Length (ft)	Y Length (ft)	Angle
LDRACK	374855	4752765	22	120	122	180
CANOPY	374840	4752728	22	39	22	180
MCC	374799	4752785	10	35	44	180
OFFICE	374751	4752754	14	61	76	180

^a Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.

Table E-4a. Gasoline Hydrocarbon Vapor Speciation

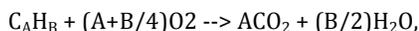
Species	Mole Percent of Species (%) ¹	Number of Carbon Atoms per Molecule	Number of Hydrogen Atoms per Molecule
Air	58.10%		
Propane	0.60%	3	8
Isobutane	2.90%	4	10
Butene	3.20%	4	8
N-Butane	17.40%	4	10
Isopentane	7.70%	5	12
Pentene	5.10%	5	10
N-Pentane	2.00%	5	12
Hexane	3.00%	6	14
Average Chain Length	--	4.48	10.57

¹ EPA-450/2-77-026, "Control of Hydrocarbons from Tank Truck Gasoline Loading Terminals", Table 2-2 (October, 1977).

Table E-4b. Stoichiometric Combustion Ratios

Ratio of CO ₂ Emitted to Hydrocarbons Combusted (scf/scf) ¹	Ratio of H ₂ O Emitted to Hydrocarbons Combusted (scf/scf) ¹	Ratio of O ₂ Combusted to Hydrocarbons Combusted (scf/scf) ¹
4.48	5.28	7.12

¹ Stoichiometric ratios are calculated based on the following combustion formula:



where A and B represent the average chain length for gasoline, calculated in Table B-3a.

Table E-4c. Exhaust Velocity Calculated using Stoichiometric Combustion

Total Exhaust Flow Rate (scfh) ¹	Flow Rate (acfm) ²	Flow Rate (m ³ /s)	Stack Velocity (m/s)
670,760.68	22,598.73	10.67	2.28

¹ Exhaust flow rate calculated using the following parameters and the stoichiometric combustion ratios presented in Table B-3b:

12,175 scfh min. dilution air at 60% vol% hydrocarbon

610,336 scfh makeup air from louvers, assumes 0% excess oxygen.

18,263 scfh hydrocarbon flow to VCU, max load rack condition.

130,105 scfh O₂ consumed.

96,500 scfh exhaust water vapor.

81,855 scfh exhaust CO₂.

4.67 m² stack area.

² Actual flow rate (acfm) is calculated using the temperature below, which is based on a source test for the VCU.

1,067 °R exhaust temp.

528 °R standard temp.

511 °R ambient temp.

**BUDGET
PROPOSAL
FOR
VAPOR COMBUSTION UNIT
MODEL NUMBER: ZCT-2-8-35-2-3/6-X**

Prepared For

Pete Richards

of

**Chevron Pipeline
5250 South 300 West
Suite 300
Murry, Utah 84107
Phone #801-268-5312**

Presented by:

Jon Baker

of

**John Zink Company
P.O. Box 21220
Tulsa Oklahoma 74121-1220
Phone #(918) 234-2911**

August 6, 1993

PROPRIETARY DOCUMENT Copyrighted 1993 by JOHN ZINK COMPANY
This document is proprietary. It is to be maintained in confidence. Use of, or copying in
whole or part is prohibited and shall only be granted by written permission of John Zink Company.



A Division of Koch Engineering Company, Inc.

SECTION II

DESIGN BASIS

The John Zink VC System is based on proprietary technology and sound engineering. Terminal loading characteristics and other design data are furnished by the customer and summarized as follows:

PRODUCTS LOADED

DESIGN PRODUCT LOADING PATTERNS

Connected to VCU

Minimum Loading Rate:	600 GPM
Maximum Loading Rate:	4800 GPM
Minimum Vapor Flow Rate to Combustor:	80 SCFM
Maximum Vapor Flow Rate to Combustor:	642 SCFM
Minimum Hydrocarbon (Measured as Propane) Concentration:	6 Vol. %
Maximum Hydrocarbon (Measured as Propane) Concentration:	60 Vol. %

AMBIENT TEMPERATURE

Summer	100°F max
Winter	-10°F min

<u>POWER REQUIRED</u>	120 V/1 PH/60 Hz
.....	480 V/3 PH/60 Hz

SECTION IV
PERFORMANCE

The John Zink Vapor Combustion Unit will remove the hydrocarbon vapors from the incoming air/hydrocarbon vapor mixture in order to comply with guaranteed emission limits as stated below.

SUMMARY

GUARANTEED HYDROCARBON EMISSIONS LEVEL
(See Section VI for Performance Guarantee)

35 mg Hydrocarbon Liter Product Loaded

SYSTEM PRESSURE DROP

12 Inches W. C. at maximum inlet flow conditions. (See Section II, Design Basis)

UTILITY REQUIREMENTS

Pilot Gas 21 SCFH Propane @ 4 PSIG or 54 SCFH of Natural Gas
@ 7 PSIG per pilot

Instrument Air None

SECTION V

EQUIPMENT SPECIFICATIONS

A John Zink Single Stage Packaged Hydrocarbon Vapor Combustion System is comprised of the items described below. Equipment specifications are preliminary and subject to change based on final engineering:

Combustion Stack

One (1) 8' O.D. x 35' O.A.H. carbon steel, self supported, ZTOF, natural draft combustion stack comprised of ceramic fiber refractory lined cylinder, anti-flashback stainless steel burners, air dampers, and pre-mix energy efficient pilots complete with automatic ignitor assembly.

The stack to be complete with lifting lugs, two (2) emission test ports, and rain shield to protect refractory.

One (1) 20" manway in bottom of combustion stack to service pilots and burners.

One (1) 4 inch pilot view port.

Ladder and platform support clips.

The refractory consists of a minimum of 2" ceramic fiber blanket installed with inconel temperature pins and keepers. Refractory is treated with a rigidizer to increase refractory life.

Welding is per AWS-D1.1 standards No testing or radiograph is included.

Combustion Air Blower

One (1) tube-axial air blower complete with 2 HP, 480 volt/3 PH/60 cycle TEAO motor and manual damper. The air assist blower provides partial combustion air and sufficient mixing energy to assure smokeless combustion. The forced air also reduces thermal radiation, shortens flame length and, by cooling burner tips, extends burner life.

Liquid Seal Drum

One (1) John Zink patented 2' diameter X approximately 6' S/S vertical liquid seal drum.

The vessel is designed, fabricated and stamped per ASME.

Design pressure is 50 PSIG.

The drum is complete with proprietary internals, controls, and the following connections:

- One (1) gas inlet
- One (1) gas outlet
- One (1) drain connection

- Two (2) level bridle connections
- One (1) level switch connection
- Two (2) level gauge connections
- One (1) liquid fill
- One (1) inspection opening
- One (1) hydrocarbon drain
- One (1) relief valve

The purpose of the liquid seal is to be a positive flame arrestor in the event other flashback preventative and suppression equipment should fail.

Burner Velocity Controls

One (1) automatic butterfly block valve with electric actuator is provided on each burner stage. Also provided are pressure switches and a pressure gauge which measures pressure of vapors in the piping to the burners. The valve(s) open, allowing gas to flow to the burners only when the combustor is operable, pilot is proven, and there is sufficient pressure in the line to keep the flow velocity through the burners above the flame propagation speed. The valves close whenever the line pressure is reduced to a point that loading operations cease. The motor operated valves prevent vapor flow the VCU, when the VCU is inoperable and/or pilot is not proven.

Flame Arrestor

As flashback protection, one (1) spiral wound crimped ribbon type flame arrestor complete with high temperature switch is provided for each burner stage. A high temperature switch is installed on burner side face of flame arrestor to automatically shutdown the vapor combustor should high temperature be sensed at the flame arrestor.

Energy Efficient Pilot Assembly

One (1) self-inspiring pilot assemblies complete with automatic electronic ignition.

Control Panel

One (1) John Zink control panel consisting of the following:

1. NEMA 4 weatherproof enclosures.
2. First out annunciator with the following indicating lights:
 - a. System power on (white)
 - b. Pilot flame proved (green)
 - c. Pilot flame failure (red shutdown)
 - d. Low level liquid seal (red shutdown)
 - e. Remote emergency shutdown (red shutdown)
 - f. High temperature flame arrestor (one provided for each burner stage) (red shutdown)
 - g. Blower failure
 - h. Reset alarm (power failure-red shutdown)
3. GE 9030 (or equal) solid state programmable controller complete with input and output modules.
4. Motor starter for air assist blower.
5. Space heater in master panel enclosure.

6. Even though the John Zink combustor is fully assembled and tested in John Zink's shop, there is control wiring which must be installed. This wiring includes:
 - a. Remote system start
 - b. Permissive to load
 - c. Remote emergency shutdown
 - d. Remote alarm
 - e. Panel power - 120 volt/60 HZ/1 Phase
 - f. Motor starter - 480 volt/60 HZ/3 Phase
 - g. Sump tank high level
 - h. Burner scanner element
 - i. Stack high temperature element (option)
 - j. Ignition transformer to spark plug on pilot assembly
 - k. Temperature controlled thermocouple (option)
 - l. Temperature controlled dampers (option)
 - m. Hydrocarbon sensor (option)
 - n. Grounding for unit

Miscellaneous Controls

The system includes additional controls items as follows:

1. Pilot gas pressure regulator and automatic block valve.
2. Liquid seal low level switch and level gauge.
3. Pressure switches for burner staging.
4. Flame arrestor high temperature switches.
5. Pilot ignition transformer and flame proven.
6. Manual damper for air assist blower.
7. Various hand valves, pressure gauges, strainers, etc.

Electrical Construction

Electrical construction is in accordance with the National Electric Code (NEC). Please advise if any unusual conditions or local codes are to be specified. (See Section VIII, Number 12, in this proposal.)

Packaging, Shop Test

The above equipment packaged to include piping, electrical wiring, conduit, paint, and other miscellaneous materials requiring only minor field assembly. A shop functional test of the packaged assembly is included.

Standard Paint Specification

1. No paint required on stainless steel surface.
2. Paint to be applied to exterior carbon steel surface only unless otherwise noted.
3. Exterior carbon steel surface preparation per SSPC-SP6-63 and prime coat with inorganic zinc (2 1/2 Mil D.F.T.).

Weight (Estimated)

Total System Weight (operational) 25,000 pounds

Assist (Enriching) Gas Addition (If Required)

Valve, piping, and controls for automatic injection of assist gas into waste vapor.

ZTOF/TC Models

The following equipment is added to the base ZTOF equipment described above for ZTOF/TC models to control combustion stack temperature:

1. Panel mounted temperature indicating controller complete with stack mounted thermocouple.
2. Enclosed combustion stack bottom with automatic modulating air dampers.
3. Assist gas automatic valve, piping, and controls. Addition of assist gas is not required on all ZTOF/TC applications.

Table C-1a. Summary of Facility-wide Potential to Emit

Source	Emissions (tpy)			
	NO _x	VOC	CO	GHG
Tank Emissions ^a	---	23.07	---	---
Fugitive Fittings ^b	---	1.11	---	---
Truck Rack Fugitive Emissions ^c	---	8.21	---	---
Truck Rack VCU Stack Emissions ^c	3.23	15.85	1.81	1,225.22
TOTAL	3.23	48.24	1.81	1,225.22
TOTAL TRUCK RACK FUGITIVE AND VCU STACK EMISSIONS	3.23	24.06	1.81	1,225.22
PSD Major Source Threshold	250	250	250	--
PSD Applicable?	NO	NO	NO	--

^a Tank throughputs are shown in Tables C-2a through C-2e. Speciation profiles used in AP-42 Chapter 7.1 methods are shown in Tables C-3b, C-4b, C-8a, and C-8d. Emission estimates from AP-42 Chapter 7.1 methods are presented in Table C-5.

^b Emissions from fugitive equipment leaks are calculated in Table C-6.

^c Emissions from the loading rack and VCU are calculated in Table C-7 and Table C-11.

Table C-1b. Post-Project Facilitywide PTE by Pollutant

Pollutant	CAS No.	Tanks ^a (tpy)	Product Loading Rack ^b (tpy)	VCU Stack ^c (tpy)	Gas-Fired Space Heater ^d (tpy)	Equipment Leak Fugitives ^e (tpy)	TOTAL FACILITY EMISSIONS	TOTAL FOR LOADING RACK, VCU, AND HEATERS	MAXIMUM HAP (tpy)
1,2,4-Trimethylbenzene	95-63-6	8.64E-02	5.53E-04	1.31E-03	0.0E+00	1.07E-02	0.10	0.00	Not a HAP
2,2,4-Trimethylpentane	540-84-1	1.34E-01	1.59E-02	3.10E-02	0.0E+00	1.95E-02	0.20	0.05	--
Benzene	71-43-2	1.24E-01	2.06E-02	3.98E-02	9.5E-07	2.80E-03	0.19	0.06	--
Biphenyl	92-52-4	6.05E-02	5.86E-10	3.65E-09	0.0E+00	1.13E-07	0.06	0.00	--
Cresols	1319-77-3	6.06E-02	7.19E-07	4.47E-06	0.0E+00	1.38E-04	0.06	0.00	--
Ethylbenzene	100-41-4	7.78E-02	1.28E-03	2.65E-03	0.0E+00	7.90E-03	0.09	0.00	--
Hexane (-n)	110-54-3	2.49E-01	3.63E-02	8.39E-02	8.1E-04	8.71E-02	0.46	0.12	YES
Isopropyl benzene (cumene)	98-82-8	6.46E-02	1.01E-04	2.56E-04	0.0E+00	2.79E-03	0.07	0.00	--
Methyl alcohol	67-56-1	6.88E-02	2.68E-03	5.16E-03	0.0E+00	3.62E-04	0.08	0.01	--
Naphthalene	91-20-3	6.34E-02	1.74E-05	6.52E-05	2.8E-07	1.24E-03	0.06	0.00	--
Phenol	108-95-2	0.00E+00	7.45E-06	4.63E-05	0.0E+00	1.43E-03	0.00	0.00	--
Styrene	100-42-5	6.09E-02	6.91E-05	1.33E-04	0.0E+00	9.36E-06	0.06	0.00	--
Toluene	108-88-3	1.99E-01	2.28E-02	4.50E-02	1.5E-06	4.37E-02	0.31	0.07	--
Xylenes	1330-20-7	1.34E-01	8.14E-03	1.66E-02	0.0E+00	3.99E-02	0.20	0.02	--
Additional HAP (tpy)^e from Natural Gas Combustion									
2-Methylnaphthalene	91-57-6	--	--	1.58E-07	1.1E-08	--	1.68E-07	0.00	--
3-Methylchloranthrene	56-49-5	--	--	1.18E-08	8.1E-10	--	1.26E-08	0.00	--
7,12-Dimethylbenz(a)anthracene	57-97-6	--	--	1.05E-07	7.2E-09	--	1.12E-07	0.00	--
Acenaphthene	83-32-9	--	--	1.18E-08	8.1E-10	--	1.26E-08	0.00	--
Acenaphthylene	203-96-8	--	--	1.18E-08	8.1E-10	--	1.26E-08	0.00	--
Anthracene	120-12-7	--	--	1.58E-08	1.1E-09	--	1.68E-08	0.00	--
Benz(a)anthracene	56-55-3	--	--	1.18E-08	8.1E-10	--	1.26E-08	0.00	--
Benzo(a)pyrene	50-32-8	--	--	7.88E-09	5.4E-10	--	8.42E-09	0.00	--
Benzo(b)fluoranthene	205-99-2	--	--	1.18E-08	8.1E-10	--	1.26E-08	0.00	--
Benzo(g,h,i)perylene	191-24-2	--	--	7.88E-09	5.4E-10	--	8.42E-09	0.00	--
Benzo(k)fluoranthene	205-82-3	--	--	1.18E-08	8.1E-10	--	1.26E-08	0.00	--
Chrysene	218-01-9	--	--	1.18E-08	8.1E-10	--	1.26E-08	0.00	--
Dibenzo(a,h)anthracene	53-70-3	--	--	7.88E-09	5.4E-10	--	8.42E-09	0.00	--
Dichlorobenzene	25321-22-6	--	--	7.88E-06	5.4E-07	--	8.42E-06	0.00	--
Fluoranthene	206-44-0	--	--	1.97E-08	1.4E-09	--	2.11E-08	0.00	--
Fluorene	86-73-7	--	--	1.84E-08	1.3E-09	--	1.97E-08	0.00	--
Formaldehyde	50-00-0	--	--	4.93E-04	3.4E-05	--	5.26E-04	0.00	--
Indeno(1,2,3-cd)pyrene	193-39-5	--	--	1.18E-08	8.1E-10	--	1.26E-08	0.00	--
Phenanthrene	85-01-8	--	--	1.12E-07	7.7E-09	--	1.19E-07	0.00	--
Pyrene	129-00-0	--	--	3.28E-08	2.3E-09	--	3.51E-08	0.00	--
Arsenic	7440-38-2	--	--	1.31E-06	9.0E-08	--	1.40E-06	0.00	--
Beryllium	7440-41-7	--	--	7.88E-08	5.4E-09	--	8.42E-08	0.00	--
Cadmium	7440-43-9	--	--	7.22E-06	5.0E-07	--	7.72E-06	0.00	--
Chromium	7440-47-3	--	--	9.19E-06	6.3E-07	--	9.83E-06	0.00	--
Cobalt	7440-48-4	--	--	5.52E-07	3.8E-08	--	5.90E-07	0.00	--
Manganese	7439-96-5	--	--	2.50E-06	1.7E-07	--	2.67E-06	0.00	--
Mercury	7439-97-6	--	--	1.71E-06	1.2E-07	--	1.82E-06	0.00	--
Nickel	7440-02-0	--	--	1.38E-05	9.5E-07	--	1.47E-05	0.00	--
Selenium	7782-49-2	--	--	1.58E-07	1.1E-08	--	1.68E-07	0.00	--
Total		1.38	0.11	0.23	0.00	0.22	1.94	0.34	--
Total HAP		1.30	0.11	0.23	8.51E-04	0.21	1.84	0.33	--
GHG (tpy CO₂e)		--	--	1171.41	53.81	--	1,225.22	2,450.43	--

^a Tank emissions calculated using AP-42 Section 7.1; results calculated in Table C-5.

^b Product loading rack fugitive VOC and speciated emissions presented in Table C-10a.

^c VCU stack emissions are calculated in Tables C-10a (uncombusted vapor) and C-13 (combustion byproducts). Certain HAP emission factors for natural gas combustion at the VCU overlap with speciated HAP calculated from uncombusted fuel loading vapors. HAP emissions from both the uncombusted vapors and natural gas combustion are included for conservatism.

^d Natural gas combustion emissions for the site's comfort heater are calculated in Table C-13.

^e Equipment leak fugitive emissions are calculated in Table C-10a.

Table C-1c. Summary of Facility-wide Potential to Emit Hazardous Air Pollutants

Source	HAP Emissions (tpy)													
	2,2,4-Trimethylpentane (isooctane) 540-84-1	Benzene 71-43-2	Biphenyl 92-52-4	Cresol 1319-77-3	Ethyl benzene 100-41-4	Hexane (-n) 110-54-3	Isopropyl Benzene (Cumene) 98-82-8	Methanol 67-56-1	Naphthalene 91-20-3	Phenol 108-95-2	Styrene 100-42-5	Toluene 108-88-3	Xylenes 1330-20-7	TOTAL
Tank Emissions ^a	0.13	0.12	0.06	0.06	0.08	0.25	0.07	0.06	0.07	0.00	0.06	0.20	0.13	1.30
Fugitive Fittings ^b	0.02	0.00	0.00	0.00	0.01	0.09	0.00	0.00	0.00	0.00	0.00	0.04	0.04	0.21
Truck Rack Loading Emissions ^b	0.02	0.02	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.02	0.01	0.11
Truck Rack VCU Stack Emissions ^b	0.03	0.04	0.00	0.00	0.00	0.07	0.00	0.01	0.00	0.00	0.00	0.04	0.02	0.21
TOTAL	0.20	0.19	0.06	0.06	0.09	0.44	0.07	0.08	0.06	0.00	0.06	0.31	0.20	1.82

^a Tank throughputs are shown in Tables C-2a through C-2e. Speciation profiles used in AP-42 Chapter 7.1 methods are shown in Tables C-3a through C-3d and C-4b. Emission estimates from AP-42 Chapter 7.1 methods are presented in Table C-5.

^b Speciated HAP emissions from fugitive equipment leaks, the loading rack, and the VCU stack are calculated in Table C-10a.

Table C-2a. Gasoline Potential Throughput

Tank #	Product	Safe Room Tank Level ^a (bbl)	Safe Room Tank Level ^a (gal)	% of Facility Throughput	Tank Throughput ^b (bbl)	Tank Throughput ^b (gal)	Tank Turnovers	Tank Type
914	Gasoline (Unleaded)	13,511	567,462	8.9%	789,014	33,138,591	58.40	IFR
915	Gasoline (Unleaded)	9,004	378,168	6.0%	525,815	22,084,218	58.40	IFR
919	Gasoline (Unleaded)	18,193	764,106	12.0%	1,062,433	44,622,188	58.40	IFR
920	Gasoline (Unleaded)	17,743	745,206	11.7%	1,036,154	43,518,468	58.40	IFR
921	Gasoline (Unleaded)	46,430	1,950,060	30.7%	2,711,415	113,879,415	58.40	IFR
922	Gasoline (Unleaded)	46,299	1,944,558	30.6%	2,703,765	113,558,110	58.40	IFR
Totals		151,180	6,349,560	100.0%	8,828,595	370,800,990		

^a Tank capacities and facility throughput limits are based on the values presented in the 2008 Tier II renewal permit application and permit.

Gasoline: 370,800,990 gal/yr

Diesel: 191,453,010 gal/yr

Transmix: 2,520,000 gal/yr

^b Potential throughputs are represented by apportioning the total facility throughput of a given product among all tanks in the service of that product.

Table C-2b. Diesel Fuel Potential Throughput

Tank #	Product	Safe Room Tank Level ^a (bbl)	Safe Room Tank Level ^a (gal)	% of Facility Throughput	Tank Throughput ^b (bbl)	Tank Throughput ^b (gal)	Tank Turnovers	Tank Type
901	Diesel Fuel	8,800	369,600	8.0%	362,625	15,230,259	41.21	Fixed
903	Diesel Fuel	9,066	380,772	8.2%	373,586	15,690,628	41.21	Fixed
905	Diesel Fuel	8,971	376,782	8.1%	369,672	15,526,211	41.21	Fixed
906	Diesel Fuel	9,028	379,176	8.2%	372,021	15,624,861	41.21	Fixed
907	Diesel Fuel	8,592	360,864	7.8%	354,054	14,870,271	41.21	IFR
908	Diesel Fuel	8,967	376,614	8.1%	369,507	15,519,288	41.21	Fixed
911	Diesel Fuel	18,974	796,908	17.2%	781,869	32,838,515	41.21	IFR
917	Diesel Fuel	19,007	798,294	17.2%	783,229	32,895,629	41.21	Fixed
918	Diesel Fuel	19,216	807,072	17.4%	791,842	33,257,348	41.21	IFR
Totals		110,621	4,646,082	100.0%	4,558,405	191,453,010		

^a Tank capacities and facility throughput limits are based on the values presented in the 2008 Tier II renewal permit application and permit.

Gasoline: 370,800,990 gal/yr

Diesel: 191,453,010 gal/yr

Transmix: 2,520,000 gal/yr

^b Potential throughputs are represented by apportioning the total facility throughput of a given product among all tanks in the service of that product.

Table C-2c. Ethanol Potential Throughput

Tank #	Product	Safe Room Tank Level (bbl)	Safe Room Tank Level ^a (gal)	% of Facility Throughput	Tank Throughput ^b (bbl)	Tank Throughput ^b (gal)	Tank Turnovers	Tank Type
916	Ethanol	15,941	669,522	100.0%	980,955	41,200,110	61.54	IFR
Totals		15,941	669,522	100.0%	980,955	41,200,110		

^a Tank capacities and facility throughput limits are based on the values presented in the 2008 Tier II renewal permit application and permit.

^b Ethanol assumed to be blended at 10% (E-10 gasoline) by volume. Condition 3.4 of the facility's current Tier II permit requires monitoring of the facility's gasoline throughput. If gasoline is moved through tanks and counted against the volumetric limit in pure form, then the maximum amount of ethanol needed to blend E-10 gasoline is (Gasoline Throughput) * 10% / 90%.

Table C-2d. Transmix Potential Throughput

Tank #	Product	Safe Room Tank Level (bbl)	Safe Room Tank Level ^a (gal)	% of Facility Throughput	Tank Throughput ^b (bbl)	Tank Throughput ^b (gal)	Tank Turnovers	Tank Type
902	Trans Mix	7,722	324,324	100.0%	60,000	2,520,000	7.77	IFR
Totals		7,722	324,324	100.0%	60,000	2,520,000		

^a Tank capacities and facility throughput limits are based on the values presented in the 2008 Tier II renewal permit application and permit.

Gasoline: 370,800,990 gal/yr

Diesel: 191,453,010 gal/yr

Transmix: 2,520,000 gal/yr

^b Potential throughputs are represented by apportioning the total facility throughput of a given product among all tanks in the service of that product. Tank 930 is out of service.

Table C-2e. Additive Potential Throughput by Tank

Tank #	Additive	Safe Room Tank Level ^a (gal)	Tank Throughput ^a (gal)	Tank Turnovers	Tank Type
A100	OGA 72040	21,000	9,000	0.43	Vertical Fixed
A101	Nemo 1124E	6,000	4,000	0.67	Horizontal Tank
A102	Innospec RT-2W/80	4,000	10,000	2.50	Horizontal Tank
A105	Keropur AP-205-20	2,000	9,000	4.50	Horizontal Tank
A108	HiTec 6590	7,500	12,000	1.60	Horizontal Tank
A110	HiTech 6610	4,000	6,000	1.50	Horizontal Tank
A112	OLI-9103.x	6,500	11,000	1.69	Horizontal Tank
A113	OLI-9103.x	7,800	11,000	1.41	Horizontal Tank
A114	Unisol Red Dye - BK 50	1,600	4,000	2.50	Horizontal Tank
Total Additive Throughput			76,000		

^a Tank capacities and facility throughput limits are based on the values presented in the 2008 Tier II renewal permit application and permit.

Table C-3a. Gasoline and Diesel Fuel Liquid Speciation

Refinery Unit	Refinery Stream	Benzene 71-43-2 (wt%)	Biphenyl 92-52-4 (wt%)	Cresol 1319-77-3 (wt%)	Isopropyl Benzene (Cumene) 98-82-8 (wt%)	Ethyl benzene 100-41-4 (wt%)	Methanol 67-56-1 (wt%)	Hexane (-n) 110-54-3 (wt%)	Naphthalene 91-20-3 (wt%)	Phenol 108-95-2 (wt%)	Styrene 100-42-5 (wt%)	1,2,4-Trimethyl benzene 95-63-6 (wt%)	2,2,4-Trimethyl pentane (Isooctane) 540-84-1 (wt%)	Toluene 108-88-3 (wt%)	Xylenes 1330-20-7 (wt%)
Distillate Blending	Diesel Fuel	ND	0.071	0.050	0.024	0.029	ND	0.016	0.170	0.260		0.225	0.012	0.050	0.122
Gasoline Blending	Conventional Gasoline	1.292		ND	0.150	0.926	0.143	1.338	0.303	ND	0.078	2.119	1.965	5.248	4.911

^a The PERF speciation data provided non-detect results for propane and butane in distillate blending (diesel fuel), and 0.029 wt% propane and 2.932 wt% butane for gasoline blending (conventional gasoline). Neither propane nor butane are HAP.

Table C-3b. Pocatello Transmix Composition Data a

Products	Product Weight Percent	Benzene	Biphenyl	Cresol	Isopropyl Benzene (Cumene)	Ethyl benzene	Methanol	Hexane (-n)	Naphthalene	Phenol	Styrene	1,2,4-Trimethyl benzene	2,2,4-Trimethyl pentane (Isooctane)	Toluene	Xylenes
		Product Weight Percent X Chemical Weight Percent^b													
Diesel	56%	ND	0.040	0.028	0.013	0.016	ND	0.009	0.095	0.145	0.000	0.126	0.007	0.028	0.068
Gasoline	44%	0.570	0.000	ND	0.066	0.408	0.063	0.590	0.134	ND	0.034	0.934	0.866	2.314	2.165
		Transmix Composition, Weight Percent^b													
Totals	100%	0.570	0.040	0.028	0.080	0.425	0.063	0.599	0.229	0.145	0.034	1.060	0.873	2.342	2.234

^a Transmix composition is taken to be a weighted average of the speciated compounds diesel and gasoline. 50 wt% of each compound is selected, as the transmix is created as pipeline interfaces of diesel and gasoline.

^b Transmix composition is calculated, for any given species, by the following formula: Transmix wt% = (wt% in gasoline * product % gasoline by weight + wt% in diesel * product % diesel by weight).

Table C-3c. Pocatello Transmix Properties

Products	Product Volume Percent (Liquid)	Product Weight Percent (Liquid)	Product Mole Percent (Liquid)	Product Mole Percent (Vapor)	Liquid MW	Vapor MW	Temp ^c (°F)	Vapor Pressure ^c (psi)	Liquid Density ^a (lb/gal)
Diesel ^a	50%	56%	38.29%	0%	188	130	46.35	0.0039	7.1
Gasoline ^a	50%	44%	61.71%	100%	92	60	46.35	6.2	5.6
Total	100%	100%	100%						
Estimated Transmix Properties ^b					129	60		3.84	6.4

^a Liquid and vapor molecular weights, vapor pressure, and liquid density for gasoline and diesel are taken from TANKS.

^b Transmix properties are based on the weighted average of gasoline and diesel properties. Molar weights are weighted by mole percent in vapor and liquid phases. Vapor pressures are weighted based on liquid mole percents. Liquid densities are weighted based on liquid mass percents.

^c Temp based on daily average ambient temperature for Pocatello, ID in MET data lookup tables provided with EPA's TANKS 4.0.9d software.

Table C-3d. Vapor Pressure Data

Temperature ^{a,c} (°F)	Temperature ^{a,c} (°R)	Temperature ^{a,c} (°C)	Gasoline ^a (RVP 15, psi)	Diesel ^b (psi)	Transmix ^{d,e} (psi)
40	500	4.63	5.5802	0.0031	3.44
50	510	10.18	6.774	0.0045	4.18
60	520	15.74	8.1621	0.0065	5.04
70	530	21.29	9.7656	0.009	6.03
80	540	26.85	11.6067	0.012	7.17
90	550	32.41	13.7085	0.016	8.47
100	560	37.96	16.0948	0.022	9.94
46.35	506.35	8.16	6.22	0.0039	3.84
70.55	530.55	21.60	9.52	0.0085	5.88

^a Data on temperature and vapor pressures obtained from AP-42, Table 7.1-2.

^b As shown in the chart at left, a line is fit to each data set from AP-42. The curve relates vapor pressure to temperature by the following equation:

$$P = A e^{B/T}$$

where A and B are constants. The equations represented in the chart are of the rearranged form,
 $\ln P = \ln A + (B/T)$

where ln A is the y-intercept of the trend line, and B is the slope. The values are as follows:

	Gasoline	Diesel
ln A	-7.0847	-21.848
A	8.38E-04	3.25E-10
B	0.0176	0.0322

^c Temperature point on the bottom row is the daily average ambient temperature for Pocatello, ID in MET data lookup tables provided with EPA's TANKS 4.0.9d software.

^d Transmix is assumed to be an ideal mixture of gasoline and diesel. Its vapor pressure is treated as the sum of the partial vapor pressures of each species.

^e Using Antoine's Equation, the following vapor pressure coefficients can be derived from the available vapor pressure and temperature information for transmix:

A	7.066
B	1,522
C	311.5

Antoine coefficients are with reference to the units, P=mmHg, T=°C, used in the equation,
 $P = (10^{(A - (B/(T + C)))))$, consistent with TANKS 4.0.9d.

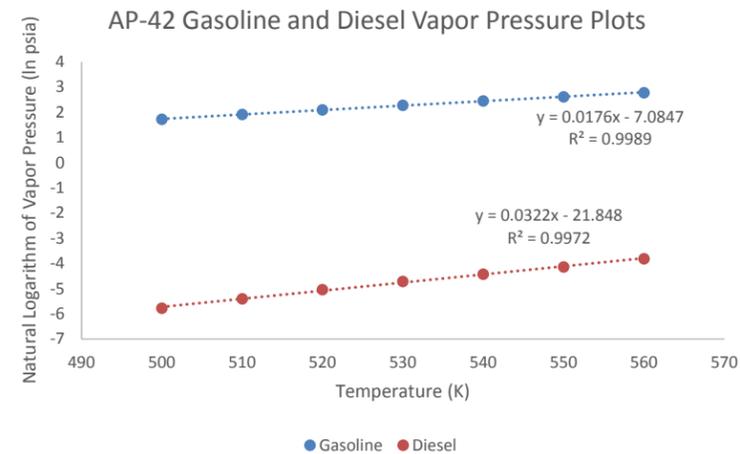


Table C-4a. Mass Fraction of Gasoline in Denatured Ethanol

Product	Volume^a (vol%)	Volume^b (100-gal basis)	Density^c (lb/gal)	Mass^c (lb/100 gal)	Mass Fraction
Ethanol	96.64	96.64	6.61	638.79	0.9714
Gasoline	3.36	3.36	5.6	18.82	0.0286
Total	100	100		657.61	1.00

^a Gasoline content can range from 1.96 vol% to 4.76 vol%. Average gasoline volume is 3.36 vol%. Ethanol content in vol% is 100 vol% less the gasoline content.

^b Volume presented is for 100 gal of denatured ethanol.

^c Densities from EPA's TANKS 4.0.9d software. Mass is the mass of each product in 100 gal of denatured ethanol, calculated as the product of density and volume.

^d Mass fraction is the ratio of product mass to total mass.

Table C-4b. Composition of Denatured Ethanol

Species	CAS No.	Gasoline Speciation (wt%)	Denatured Ethanol Speciation (wt%)
Benzene	71-43-2	1.292	0.037
Isopropyl Benzene (Cumene)	98-82-8	0.150	0.004
Ethyl benzene	100-41-4	0.926	0.026
Methanol	67-56-1	0.143	0.004
Hexane (-n)	110-54-3	1.338	0.038
Naphthalene	91-20-3	0.303	0.009
Styrene	100-42-5	0.078	0.002
1,2,4-Trimethylbenzene	95-63-6	2.119	0.061
2,2,4-Trimethylpentane (Isooctane)	540-84-1	1.965	0.056
Toluene	108-88-3	5.248	0.150
Xylenes	1330-20-7	4.911	0.141
Other VOC		81.527	2.333
Ethanol	64-17-5		97.139
TOTAL			100.000

^a Gasoline speciation based on data from PERF refinery gasoline blending.

^b Speciation calculated as the product of the wt% of a species in gasoline and the wt% of gasoline in the mixture. Ethanol content is the product of the wt% of ethanol in denatured ethanol above. Other VOC represent the difference between the partial speciation and 100 wt%.

Table C-5. Tank Emission Calculation Results ^{a,b}

Tank No.	Roof Type	Tank Service	Volume (gal)	Throughput (gal/yr)	Turnovers (per yr)	1,2,4-Trimethyl benzene 95-63-6 NO	1,3,5-Triethyl benzene 102-25-0 NO	2,2,4-Trimethyl pentane (Isooctane) 540-84-1 YES	2-Ethylhexyl nitrate 27247-96-7 NO	Benzene 71-43-2 YES	Biphenyl 92-52-4 YES	C. I. Solvent Red 164 92257-31-3 NO	Cresol 1319-77-3 YES	Ethanol 64-17-5 NO	Ethyl benzene 100-41-4 YES	Hexane (-n) 110-54-3 YES	Isopropyl Benzene (Cumene) 98-82-8 YES	Methanol 67-56-1 YES	Naphthalene 91-20-3 YES	Phenol 108-95-2 YES	Styrene 100-42-5 YES	Toluene 108-88-3 YES	Xylenes 1330-20-7 YES	Unidentified Components --	Grand Total
901	Vertical Fixed Roof Tank	Diesel Fuel	369,600	15,230,259	41.21	1.86E-03	--	2.83E-03	--	0.00E+00	1.21E-05	--	2.96E-05	0.00E+00	1.25E-03	1.21E-02	4.62E-04	0.00E+00	1.73E-04	--	0.00E+00	6.54E-03	4.39E-03	0.1552	0.18
902	Internal Floating Roof Tank	Transmix	324,324	2,520,000	7.77	1.99E-04	--	3.34E-03	--	4.26E-03	2.56E-06	--	1.97E-06	0.00E+00	3.13E-04	7.36E-03	2.86E-05	5.74E-04	1.77E-05	--	1.75E-05	5.00E-03	1.39E-03	1.9701	1.99
903	Vertical Fixed Roof Tank	Diesel Fuel	380,772	15,690,628	41.21	1.75E-03	--	2.66E-03	--	0.00E+00	1.14E-05	--	2.80E-05	0.00E+00	1.18E-03	1.14E-02	4.36E-04	0.00E+00	1.63E-04	--	0.00E+00	6.16E-03	4.14E-03	0.1463	0.17
905	Vertical Fixed Roof Tank	Diesel Fuel	376,782	15,526,211	41.21	1.85E-03	--	2.82E-03	--	0.00E+00	1.21E-05	--	2.96E-05	0.00E+00	1.25E-03	1.21E-02	4.61E-04	0.00E+00	1.73E-04	--	0.00E+00	6.52E-03	4.38E-03	0.1549	0.18
906	Vertical Fixed Roof Tank	Diesel Fuel	379,176	15,624,861	41.21	1.89E-03	--	2.89E-03	--	0.00E+00	1.23E-05	--	3.03E-05	0.00E+00	1.28E-03	1.24E-02	4.72E-04	0.00E+00	1.77E-04	--	0.00E+00	6.67E-03	4.49E-03	0.1585	0.19
907	Internal Floating Roof Tank	Diesel Fuel	360,864	14,870,271	41.21	1.34E-04	--	6.46E-05	--	0.00E+00	3.08E-05	--	2.21E-05	0.00E+00	3.80E-05	2.65E-04	1.96E-05	0.00E+00	7.65E-05	--	0.00E+00	1.57E-04	1.42E-04	0.0460	0.05
908	Vertical Fixed Roof Tank	Diesel Fuel	376,614	15,519,288	41.21	1.86E-03	--	2.84E-03	--	0.00E+00	1.21E-05	--	2.98E-05	0.00E+00	1.26E-03	1.21E-02	4.64E-04	0.00E+00	1.74E-04	--	0.00E+00	6.56E-03	4.41E-03	0.1557	0.19
911	Internal Floating Roof Tank	Diesel Fuel	796,908	32,838,515	41.21	1.71E-04	--	3.18E-05	--	0.00E+00	4.94E-05	--	3.50E-05	0.00E+00	3.04E-05	1.12E-04	2.05E-05	0.00E+00	1.20E-04	--	0.00E+00	8.87E-05	1.21E-04	0.0702	0.07
914	Internal Floating Roof Tank	Gasoline (Premium)	567,462	33,138,591	58.40	1.56E-03	--	5.78E-03	--	6.64E-03	0.00E+00	--	0.00E+00	0.00E+00	9.93E-04	1.08E-02	1.26E-04	8.81E-04	2.03E-04	--	7.28E-05	1.01E-02	4.93E-03	2.1387	2.18
915	Internal Floating Roof Tank	Gasoline (Premium)	378,168	22,084,218	58.40	1.32E-03	--	6.47E-03	--	7.70E-03	0.00E+00	--	0.00E+00	0.00E+00	9.53E-04	1.27E-02	1.13E-04	1.03E-03	1.64E-04	--	6.71E-05	1.08E-02	4.64E-03	2.5697	2.62
916	Internal Floating Roof Tank	Ethanol	669,522	41,200,110	61.54	5.54E-05	--	9.80E-05	--	9.53E-05	0.00E+00	--	0.00E+00	1.76E-01	2.75E-05	1.41E-04	4.10E-06	1.21E-05	7.73E-06	--	2.17E-06	2.03E-04	1.43E-04	0.0044	0.18
917	Vertical Fixed Roof Tank	Diesel Fuel	798,294	32,895,629	41.21	3.80E-03	--	5.79E-03	--	0.00E+00	2.48E-05	--	6.07E-05	0.00E+00	2.57E-03	2.48E-02	9.47E-04	0.00E+00	3.55E-04	--	0.00E+00	1.34E-02	9.00E-03	0.3180	0.38
918	Internal Floating Roof Tank	Diesel Fuel	807,072	33,257,348	41.21	2.15E-04	--	7.72E-05	--	0.00E+00	5.48E-05	--	3.90E-05	0.00E+00	5.15E-05	3.08E-04	2.90E-05	0.00E+00	1.34E-04	--	0.00E+00	1.94E-04	1.96E-04	0.0799	0.08
919	Internal Floating Roof Tank	Gasoline (Unleaded)	764,106	44,622,188	58.40	1.72E-03	--	7.10E-03	--	8.26E-03	0.00E+00	--	0.00E+00	0.00E+00	1.15E-03	1.34E-02	1.42E-04	1.11E-03	2.19E-04	--	8.31E-05	1.22E-02	5.68E-03	2.6083	2.66
920	Internal Floating Roof Tank	Gasoline (Unleaded)	745,206	43,518,468	58.40	1.68E-03	--	7.04E-03	--	8.20E-03	0.00E+00	--	0.00E+00	0.00E+00	1.14E-03	1.33E-02	1.40E-04	1.11E-03	2.14E-04	--	8.16E-05	1.21E-02	5.59E-03	2.5957	2.65
921	Internal Floating Roof Tank	Gasoline (Unleaded)	1,950,060	113,879,415	58.40	2.99E-03	--	1.17E-02	--	1.36E-02	0.00E+00	--	0.00E+00	0.00E+00	1.94E-03	2.21E-02	2.44E-04	1.80E-03	3.84E-04	--	1.41E-04	2.02E-02	9.61E-03	4.4117	4.50
922	Internal Floating Roof Tank	Gasoline (Unleaded)	1,944,558	113,558,110	58.40	3.08E-03	--	1.27E-02	--	1.47E-02	0.00E+00	--	0.00E+00	0.00E+00	2.06E-03	2.39E-02	2.55E-04	1.99E-03	3.91E-04	--	1.49E-04	2.18E-02	1.02E-02	4.6551	4.75
A100	Vertical Fixed Roof Tank	Additive: OGA 72040	21,000	9,000	0.43	1.90E-02	--	1.90E-02	--	1.90E-02	1.90E-02	--	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	1.90E-02	--	1.90E-02	1.90E-02	1.90E-02	0.0190	0.0190
A101	Horizontal Tank	Additive: Nemo 1124E	6,000	4,000	0.67	5.60E-03	--	5.60E-03	--	5.60E-03	5.60E-03	--	5.60E-03	5.60E-03	5.60E-03	5.60E-03	5.60E-03	5.60E-03	5.60E-03	--	5.60E-03	5.60E-03	5.60E-03	0.0056	0.0056
A102	Horizontal Tank	Additive: Innospec RT-2W/80	4,000	10,000	2.50	4.41E-03	--	4.41E-03	--	4.41E-03	4.41E-03	--	4.41E-03	4.41E-03	4.41E-03	4.41E-03	4.41E-03	4.41E-03	4.41E-03	--	4.41E-03	4.41E-03	4.41E-03	0.0044	0.0044
A105	Horizontal Tank	Additive: Keropur AP-205-20	2,000	9,000	4.50	2.54E-03	--	2.54E-03	--	2.54E-03	2.54E-03	--	2.54E-03	2.54E-03	2.54E-03	2.54E-03	2.54E-03	2.54E-03	2.54E-03	--	2.54E-03	2.54E-03	2.54E-03	0.0025	0.0025
A108	Horizontal Tank	Additive: HiTec 6590	7,500	12,000	1.60	8.93E-03	--	8.93E-03	--	8.93E-03	8.93E-03	--	8.93E-03	8.93E-03	8.93E-03	8.93E-03	8.93E-03	8.93E-03	8.93E-03	--	8.93E-03	8.93E-03	8.93E-03	0.0089	0.0089
A110	Horizontal Tank	Additive: HiTech 6610	4,000	6,000	1.50	3.99E-03	--	3.99E-03	--	3.99E-03	3.99E-03	--	3.99E-03	3.99E-03	3.99E-03	3.99E-03	3.99E-03	3.99E-03	3.99E-03	--	3.99E-03	3.99E-03	3.99E-03	0.0040	0.0040
A112	Horizontal Tank	Additive: OLI-9103.x	6,500	11,000	1.69	6.17E-03	--	6.17E-03	--	6.17E-03	6.17E-03	--	6.17E-03	6.17E-03	6.17E-03	6.17E-03	6.17E-03	6.17E-03	6.17E-03	--	6.17E-03	6.17E-03	6.17E-03	0.0062	0.0062
A113	Horizontal Tank	Additive: OLI-9103.x	7,800	11,000	1.41	7.32E-03	--	7.32E-03	--	7.32E-03	7.32E-03	--	7.32E-03	7.32E-03	7.32E-03	7.32E-03	7.32E-03	7.32E-03	7.32E-03	--	7.32E-03	7.32E-03	7.32E-03	0.0073	0.0073
A114	Horizontal Tank	Additive: Unisol Red Dye - BK 50	1,600	4,000	2.50	2.32E-03	--	2.32E-03	--	2.32E-03	2.32E-03	--	2.32E-03	2.32E-03	2.32E-03	2.32E-03	2.32E-03	2.32E-03	2.32E-03	--	2.32E-03	2.32E-03	2.32E-03	0.0023	0.0023
TOTAL Tank Emissions:						0.09	0.00	0.13	0.00	0.12	0.06	0.00	0.06	0.24	0.08	0.25	0.06	0.07	0.06	0.00	0.06	0.20	0.13	22.30	23.07

^a All emission rates are reported in tpy, based on AP-42 Chapter 7.1 calculations.

^b Tank HAP emissions from the additive tanks are conservatively set equal to total VOC emissions. This approach is appropriate because, even on this assumption, the additive tanks do not contribute substantially to the facility's total HAP or speciated HAP emissions.

Table C-6. Fugitive Emissions from Equipment Leaks

Source	Service	Number of Units	Emission Factor^a (kg/hr/source)	Emission Factor^b (lb/hr/source)	Emissions^c (tons/yr)
Valves	Liquid	1,265	4.30E-05	9.48E-05	0.53
Valves	Vapor	33	1.30E-05	2.87E-05	0.00
Fittings	Liquid	1,265	8.00E-06	1.76E-05	0.10
Fittings	Vapor	110	4.20E-05	9.26E-05	0.04
Pump Seals	Liquid	61	5.40E-04	1.19E-03	0.32
Others	Liquid	98	1.30E-04	2.87E-04	0.12
TOTAL					1.11

^a Emission factors are from Table 2-3 (Marketing Terminal Average Emission Factors) in the "Protocol for Equipment Leak Emission Estimates", EPA-453/R-95-017, November 1995.

^b Conversion factor used: EF (lb/hr/source) = 2.205 * EF (kg/hr/source)

^c Emissions, Tons/yr = (# of units)(emission factor, lb/hr)(24 hr/day)(365 day/yr)/(2,000lb/ton)

Table C-7a. Loading Rack and VCU - Annual Emissions of VOC

Product	Quantity Loaded (Mgal/yr)	VOC Emission Factor		VOC Emissions (tpy)
		(mg/L)	(lb/Mgal)	
Gasoline ^{a,b,c}	370,801	10	0.08	15.47
Diesel ^a	191,453		3.72E-04	0.04
Transmix ^{a,d}	2,520		0.27	0.34
Total Stack Emissions:				15.85
Fugitive Vapor Leakage from Gasoline ^e	370,801		0.04	8.17
Fugitive Vapor Leakage from Diesel ^e	191,453		0.00	0.01
Fugitive Vapor Leakage from Transmix ^e	2,520		0.03	0.03
Total Fugitive Emissions:				8.21

^a Loading emission factors for diesel fuel and transmix are calculated using Equation 1 in AP-42, Section 5.2, Transportation and Marketing of Petroleum Liquids, dated July 2008. Equation 1 is $L = 12.46 * S * P * M / T * (1 - \text{eff} / 100)$. Vapors are captured at an estimated rate of 99.2%.

S =	0.60	Saturation factor for tank trucks, submerged loading, dedicated normal service. AP-42 Table 5.2-1, 6/08.
P _{Distillate # 2} =	0.0039	(psia) True vapor pressure linearly interpolated based on data for Distillate Fuel Oil No. 2 provided in AP-42, Section 7, Table 7.1-2, dated November 2006. See Table C-3d for calculations.
M _{Distillate # 2} =	130	(lb/lbmol) Molecular weight of Distillate Fuel Oil No. 2 vapor at 60 F (AP-42, Section 7, Table 7.1-2, dated November 2006)
P _{Gasoline RVP15} =	6.22	(psia) True vapor pressure interpolated based on data for Gasoline RVP 15 provided in AP-42, Section 7, Table 7.1-2, dated November 2006. See Table C-3d for calculations.
M _{Gasoline RVP15} =	60	(lb/lbmol) Molecular weight of Gasoline RVP 15 vapor at 60 F (AP-42, Section 7, Table 7.1-2, dated November 2006)
P _{Transmix} =	3.84	(psia) True vapor pressure interpolated based on data for Gasoline RVP 15 and diesel fuel provided in AP-42, Section 7, Table 7.1-2, dated November 2006. See Table C-3d for calculations.
M _{Transmix} =	60	(lb/lbmol) Molecular weight of transmix vapor at 60 F. See Table C-3c for calculations.
T =	506	(°R) Daily Average Ambient Temperature for Pocatello, ID, from EPA's TANKS 4.0.9d meteorology data tables.
Control Eff.=	95%	Assumed average control efficiency for VCU per AP-42, Section 5.2, page 5.2-6 (range provided between 90-99%). Efficiency is used for diesel fuel and transmix.

This equation is also used to calculate uncontrolled loading emission factor for gasoline loading, for the purpose of calculating fugitive losses from gasoline loading, as shown in footnote 'e.'

^b Permit T2-2008.0026, Condition 3.8, stipulates that TOC emissions from the VCU shall not exceed 10 milligrams per liter of liquid throughput into gasoline tank trucks, per 40 CFR 63.422(b). Diesel fuel and transmix do not meet the definition of gasoline, so the AP-42 loading equation in footnote 'a' is used for these liquids.

^c Denatured ethanol and fuel additives are added to gasoline prior to loading into the tanker trucks. The quantity loaded includes denatured ethanol, additive, and gasoline. The gasoline mixture (gasoline blended with ethanol and/or additive) meets the definition of gasoline provided in 40 CFR 60.501.

^d Transmix properties are calculated in Tables C-3c and C-3d.

^e Per AP-42, Chapter 5, section 5.2.2.1.1 page 5.2-6, not all of the displaced vapors reach the control device because of leakage from both the tank truck and collection system. In order to capture these fugitive emissions, the uncontrolled emission factors provided in AP-42, Table 5.2-5 for loading operations are used in conjunction with a 99.2% collection efficiency for tank trucks that meet the MACT-level annual leak test. Therefore, the emission factor associated to the leakage (EF_{Leak}) can be calculated as follows: $EF_{Leak} = (1 - \text{Collection Eff.} / 100) * EF_{Uncontrolled}$

EF _{Uncontrolled} =	5.51	(lb/Mgal) Uncontrolled Organic Emission Factor for Gasoline, submerged loading.
EF _{Uncontrolled} =	0.008	(lb/Mgal) Uncontrolled Organic Emission Factor for Distillate Oil No.2 for Tank-Trucks
EF _{Uncontrolled} =	3.40	(lb/Mgal) Uncontrolled Organic Emission Factor for Transmix
Control Eff.	99.2%	

Table C-7b. Truck Loading Rack and VCU - Short-Term Emissions Using MMBtu/hr Threshold

Variable	Value	Units of Measure
Flow of VOC Vapors from Rack ^a	13,134,963	scf/yr at 46.68 °F
Molar Gas Constant	0.73	atm ft ³ / lbmol °R
Molar Flow of Hydrocarbon to VCU ^b	0.51	mol/s hydrocarbons as C ₄ H ₁₀
HHV as Butane ^c	2,877.60	kJ/mol HHV
Maximum Heat Input Rate to VCU	43,961.85	MMBtu/yr HHV
Emission Factors ^d		
(lb/MMBtu)	Emissions	(tpy)
PM	7.84E-03	0.17
PM ₁₀	7.84E-03	0.17
PM _{2.5}	7.84E-03	0.17
SO ₂ ^e	8.16E-04	0.02
NO _x	1.47E-01	3.23
CO	8.24E-02	1.81

^a Based on the calculated uncontrolled vapor emissions of the maximum annual throughput of each product.

^b Calculated as: (vapor flow, acf/min)*(vol% HC as propane, vol%)/(0.7302 atm ft³ / lbmol °R)*(1 atm)/(0 °F + 459.67 F°)*(453.5924 g/lb)/(60 s/min)

^c Per CRC Handbook of Chemistry and Physics, 86th Edition, p. 5-70.

^d Emission factors from AP-42, Section 1.5, external combustion of butane vapors, Tables 1.5-1, converted to lb/MMBtu using the 102 x 10⁶ BTU/10³ gal basis on which the AP-42 factors are based.

^e The emission factor in AP-42, Section 1.5 for SO₂ is (0.09)*(S) lb/10³ gal fuel combusted, where S is the sulfur content of the fuel in gr/100 ft³. A sulfur content of 0.59 gr / 100 scf is calculated, based on a very conservative assumption that 100% of sulfur in gasoline is vaporized.

Gasoline sulfur content:	80	ppmwt based on federal EPA Tier 2 cap for gasoline sulfur
Density of gasoline:	5.6	lb/gal
Vapors generated during loading:	5.51E-03	lb vapors / gal loaded
Gasoline vapor molar mass	60.00	lb / lbmol
Temperature	506.35	°R
Gasoline Vapor Mass	0.16	lb vapor / scf vapor
Gasoline Vapor Concentration of Sulfur	1.32E-02	lb S / scf vapor
Gasoline Vapor Concentration of Sulfur	0.92	gr S / 100 scf vapor

Table C-8a. Speciated Liquid Weight Percents a

Species CAS No.	1,2,4- Trimethyl benzene 95-63-6	2,2,4- Trimethyl pentane 540-84-1	Benzene 71-43-2	Biphenyl 92-52-4	Cresol 1319-77-3	Ethyl benzene 100-41-4	Hexane (-n) 110-54-3	Isopropyl benzene (cumene) 98-82-8	Methanol 67-56-1	Naphthalene 91-20-3	Phenol 108-95-2	Styrene 100-42-5	Toluene 108-88-3	Xylenes 1330-20-7	Total
Product	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)
Gasoline ^b	2.119	1.965	1.292			0.926	1.338	0.15	0.143	0.303		0.078	5.248	4.911	18.473
Diesel ^c	0.225	0.012		0.071	0.05	0.029	0.016	0.024		0.17	0.26		0.05	0.122	1.029
Transmix ^d	1.060	0.873	0.570	0.040	0.028	0.425	0.599	0.080	0.063	0.229	0.145	0.034	2.342	2.234	8.721

^a All speciation data are presented as wt%.

^b Gasoline speciation is obtained from PERF speciation data for conventional gasoline.

^c Diesel fuel speciation is obtained from PERF speciation data for diesel fuel.

^d Transmix speciation is calculated as a weighted average of gasoline and diesel speciation as shown in Table C-3b.

Table C-8b. Speciated Liquid Weight Fractions a

Species CAS No. Product	1,2,4- Trimethyl benzene 95-63-6 (wt. frac.)	2,2,4- Trimethyl pentane 540-84-1 (wt. frac.)	Benzene 71-43-2 (wt. frac.)	Biphenyl 92-52-4 (wt. frac.)	Cresol 1319-77-3 (wt. frac.)	Ethyl benzene 100-41-4 (wt. frac.)	Hexane (-n) 110-54-3 (wt. frac.)	Isopropyl benzene (cumene) 98-82-8 (wt. frac.)	Methanol 67-56-1 (wt. frac.)	Naphthalene 91-20-3 (wt. frac.)	Phenol 108-95-2 (wt. frac.)	Styrene 100-42-5 (wt. frac.)	Toluene 108-88-3 (wt. frac.)	Xylenes 1330-20-7 (wt. frac.)	Total (wt. frac.)
Gasoline	2.12E-02	1.97E-02	1.29E-02	0.00E+00	0.00E+00	9.26E-03	1.34E-02	1.50E-03	1.43E-03	3.03E-03	0.00E+00	7.80E-04	5.25E-02	4.91E-02	0.185
Diesel No. 2	2.25E-03	1.20E-04	0.00E+00	7.10E-04	5.00E-04	2.90E-04	1.60E-04	2.40E-04	0.00E+00	1.70E-03	2.60E-03	0.00E+00	5.00E-04	1.22E-03	0.010
Transmix	1.06E-02	8.73E-03	5.70E-03	3.97E-04	2.80E-04	4.25E-03	5.99E-03	7.96E-04	6.31E-04	2.29E-03	1.45E-03	3.44E-04	2.34E-02	2.23E-02	0.087

^a All speciation data are presented as weight fractions.

^b Gasoline speciation is obtained from PERF speciation data for conventional gasoline.

^c Diesel fuel speciation is obtained from PERF speciation data for diesel fuel.

^d Transmix speciation is calculated as a weighted average of gasoline and diesel speciation as shown in Table C-3b.

Table C-8c. Chemical Properties by Species a

Properties ^a	1,2,4- Trimethyl benzene 95-63-6	2,2,4- Trimethyl pentane 540-84-1	Benzene 71-43-2	Biphenyl 92-52-4	Cresol 1319-77-3	Ethyl benzene 100-41-4	Hexane (-n) 110-54-3	Isopropyl benzene (cumene) 98-82-8	Methanol 67-56-1	Naphthalene 91-20-3	Phenol 108-95-2	Styrene 100-42-5	Toluene 108-88-3	Xylenes 1330-20-7
Mi	120.19	114.23	78.11	154.21	108.14	106.17	86.18	120.19	32.04	128.17	94.11	104.15	92.14	106.17
A	7.04383	6.8118	6.905	--	7.508	6.975	6.876	6.93666	7.897	7.37	7.133	7.14	6.954	7.009
B	1573.267	1257.84	1211.033	--	1856.36	1424.255	1171.17	1460.793	1474.08	1938.36	1516.79	1574.51	1344.8	1426.266
C	208.56	220.74	220.79	--	199.07	213.21	224.41	207.78	229.13	222.61	174.95	224.09	219.48	215.11
Source ^b	TANKS	TANKS	AP-42	--	AP-42	AP-42	AP-42	AP-42	AP-42	AP-42	AP-42	AP-42	AP-42	AP-42

^a Chemical properties are as follows: Mi = molar mass of species; A, B, C = Antoine equation constants for each species following the form, $P \text{ (mm Hg)} = 10^{(A - (B/(T, ^\circ\text{C}) + C))}$

^b Antoine coefficients are obtained from two sources. Coefficients for species marked "TANKS" are based on EPA's database of Antoine coefficients provided with its TANKS 4.0.9d software. Coefficients for species marked "AP-42" are from AP-42 Table 7.1-5. Biphenyl vapor pressure is estimated in Table C-8e from an empirical correlation, so no Antoine coefficients are provided.

Table C-8d. Vapor Speciation Calculations

Mixture Properties ^a				Vapor Weight Fraction Calculations (Z _{i,V}) ^f													Total	
				1,2,4-Trimethyl benzene 95-63-6	2,2,4-Trimethyl pentane 540-84-1	Benzene 71-43-2	Biphenyl ^f 92-52-4	Cresol 1319-77-3	Ethyl benzene 100-41-4	Hexane (-n) 110-54-3	Isopropyl benzene (cumene) 98-82-8	Methanol 67-56-1	Naphthalene 91-20-3	Phenol 108-95-2	Styrene 100-42-5	Toluene 108-88-3		Xylenes 1330-20-7
Gasoline^b	ML	92	P	1.16E-02	3.97E-01	7.90E-01	3.87E-07	6.73E-04	6.64E-02	1.33E+00	2.83E-02	9.25E-01	1.78E-03	1.34E-03	4.38E-02	2.13E-01	7.98E-02	0.013
	MV	60	Pi	1.88E-04	6.28E-03	1.20E-02	0.00E+00	0.00E+00	5.33E-04	1.89E-02	3.25E-05	3.80E-03	3.87E-06	0.00E+00	3.02E-05	1.11E-02	3.40E-03	
	PVA	6.22	xi	1.62E-02	1.58E-02	1.52E-02	0.00E+00	0.00E+00	8.02E-03	1.43E-02	1.15E-03	4.11E-03	2.17E-03	0.00E+00	6.89E-04	5.24E-02	4.26E-02	
	TLA	7.97	yi	3.03E-05	1.01E-03	1.93E-03	0.00E+00	0.00E+00	8.57E-05	3.05E-03	5.23E-06	6.11E-04	6.22E-07	0.00E+00	4.86E-06	1.79E-03	5.46E-04	
			Z _{i,V}	6.06E-05	1.92E-03	2.52E-03	0.00E+00	0.00E+00	1.52E-04	4.38E-03	1.05E-05	3.26E-04	1.33E-06	0.00E+00	8.43E-06	2.75E-03	9.67E-04	
Diesel No. 2^c	ML	188	P	1.16E-02	3.97E-01	7.90E-01	3.87E-07	6.73E-04	6.64E-02	1.33E+00	2.83E-02	9.25E-01	1.78E-03	1.34E-03	4.38E-02	2.13E-01	7.98E-02	0.193
	MV	130	Pi	4.08E-05	7.84E-05	0.00E+00	3.35E-10	5.85E-07	3.41E-05	4.63E-04	1.06E-05	0.00E+00	4.43E-06	6.96E-06	0.00E+00	2.17E-04	1.72E-04	
	PVA	0.00391	xi	3.52E-03	1.97E-04	0.00E+00	8.66E-04	8.69E-04	5.14E-04	3.49E-04	3.75E-04	0.00E+00	2.49E-03	5.19E-03	0.00E+00	1.02E-03	2.16E-03	
	TLA	7.97	yi	1.04E-02	2.00E-02	0.00E+00	8.55E-08	1.50E-04	8.71E-03	1.18E-01	2.72E-03	0.00E+00	1.13E-03	1.78E-03	0.00E+00	5.55E-02	4.41E-02	
			Z _{i,V}	9.65E-03	1.76E-02	0.00E+00	1.01E-07	1.24E-04	7.12E-03	7.84E-02	2.51E-03	0.00E+00	1.12E-03	1.29E-03	0.00E+00	3.93E-02	3.60E-02	
Transmix^d	ML	129	P	1.16E-02	3.97E-01	7.90E-01	3.87E-07	6.73E-04	6.64E-02	1.33E+00	2.83E-02	9.25E-01	1.78E-03	1.34E-03	4.38E-02	2.13E-01	7.98E-02	0.013
	MV	60	Pi	1.32E-04	3.90E-03	7.42E-03	1.28E-10	2.24E-07	3.42E-04	1.19E-02	2.42E-05	2.34E-03	4.08E-06	2.67E-06	1.86E-05	6.96E-03	2.16E-03	
	PVA	3.84	xi	1.14E-02	9.84E-03	9.39E-03	3.31E-04	3.33E-04	5.15E-03	8.95E-03	8.52E-04	2.53E-03	2.30E-03	1.99E-03	4.25E-04	3.27E-02	2.71E-02	
	TLA	7.97	yi	3.43E-05	1.02E-03	1.93E-03	3.34E-11	5.84E-08	8.91E-05	3.09E-03	6.29E-06	6.11E-04	1.06E-06	6.95E-07	4.85E-06	1.81E-03	5.63E-04	
			Z _{i,V}	6.87E-05	1.94E-03	2.52E-03	8.58E-11	1.05E-07	1.58E-04	4.44E-03	1.26E-05	3.26E-04	2.27E-06	1.09E-06	8.42E-06	2.79E-03	9.96E-04	

^a Mixture property nomenclature:

Mi = molecular weight of component i, lb/lb-mole

xi = liquid mole fraction of component i, lb-mole/lb-mole

ML = molecular weight of liquid stock, lb/lb-mole

yi = vapor mole fraction of component i, lb-mole/lb-mole

MV = molecular weight of vapor stock, lb/lb-mole

Z_{i,L} = weight fraction of component i in the liquid, lb/lb

P = vapor pressure of component i at liquid surface temperature, psia

Z_{i,V} = weight fraction of component i in the vapor, lb/lb

Pi = partial pressure of component i, psia

PVA = total vapor pressure of liquid mixture, psia, values interpolated from AP-42 Table 7.1-2

TLA = average liquid surface temperature, degrees C. (for tanks in Pocatello, ID with specular aluminum exterior, per TANKS 4.0.9d)

^b Gasoline liquid and vapor molar masses are obtained from TANKS 4.0.9d. Temperature is the daily average ambient temperature at Pocatello, ID, listed in the MET data tables of TANKS 4.0.9d. Vapor pressure of liquid stock at this temperature is calculated in Table C-3d by regression from vapor pressure data available in AP-42, Table 7.1-2.

^c Distillate fuel oil liquid and vapor molar masses are obtained from TANKS 4.0.9d. Temperature is the daily average ambient temperature at Pocatello, ID, listed in the MET data tables of TANKS 4.0.9d. Vapor pressure of liquid stock at this temperature is calculated in Table C-3d by regression from vapor pressure data available in AP-42, Table 7.1-2.

^d Transmix liquid and vapor molar masses are obtained from TANKS 4.0.9d. Temperature is the daily average ambient temperature at Pocatello, ID, listed in the MET data tables of TANKS 4.0.9d. Vapor pressure of liquid stock at this temperature is calculated in Table C-3d as an average of gasoline and diesel vapor pressures, weighted by fractions of gasoline and diesel (on a molar basis).

^e Vapor mole fractions (Z_{i,V}) for each species in each product are calculated using the following method based on AP-42 Section 7.1:

$$xi = ((Z_{i,L})(ML))/Mi$$

$$P = (10^{(A - (B/(TLA + C))}))(0.0193368)$$

$$Pi = (P)(xi)$$

$$yi = Pi/PVA$$

$$Z_{i,V} = ((yi)(Mi))/MV = (10^{(A - (B/(TLA + C))}))(0.0193368)(Z_{i,L})(ML)/PVA/MV$$

^f The vapor pressure of biphenyl species is not evaluated with an Antoine equation. Instead, biphenyl vapor pressure as a function of temperature is regressed from saturation curve data presented in Perry's Chemical Engineer's Handbook, 6th ed., Table 3-8, shown in Table C-8e.

Table C-8e. Saturation Curve Data for Biphenyl

Temperature (°C)	Vapor Pressure	
	(mmHg)	psia
70.6	1	0.02
101.8	5	0.10
117	10	0.19
134.2	20	0.39
152.5	40	0.77
165.2	60	1.16
180.7	100	1.93

^a Biphenyl vapor pressure as a function of temperature is regressed from saturation curve data presented in Perry's Chemical Engineer's Handbook, 6th ed., Table 3-8. The regressed exponential function is $P = 1.4352 \text{ E-}11 * T^{4.9139}$, where T is in °C and P is in psia.

^b Using Antoine's Equation, the following vapor pressure coefficients can be derived from the available vapor pressure and temperature information for biphenyl:

A	7.713
B	2,441
C	246.6

Antoine coefficients are with reference to the units, P=mmHg, T=°C, used in the equation, $P = (10^{(A - (B/(T + C)))))$, consistent with TANKS 4.0.9d.

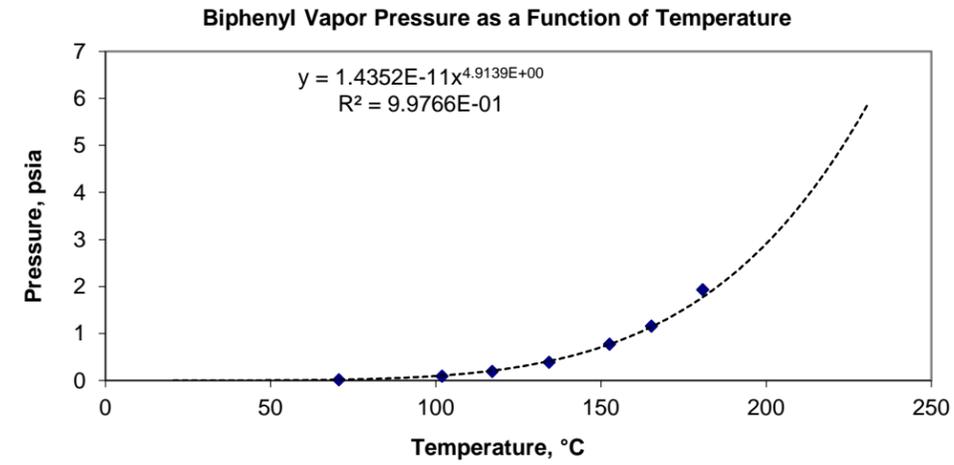


Table C-9a. Speciated Liquid Weight Percents a

Species CAS No.	1,2,4- Trimethyl benzene 95-63-6	2,2,4- Trimethyl pentane 540-84-1	Benzene 71-43-2	Biphenyl 92-52-4	Cresol 1319-77-3	Ethyl benzene 100-41-4	Hexane (-n) 110-54-3	Isopropyl benzene (cumene) 98-82-8	Methanol 67-56-1	Naphthalene 91-20-3	Phenol 108-95-2	Styrene 100-42-5	Toluene 108-88-3	Xylenes 1330-20-7	Total
Product	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)	(wt%)
Gasoline ^b	2.119	1.965	1.292			0.926	1.338	0.15	0.143	0.303		0.078	5.248	4.911	18.473
Diesel ^c	0.225	0.012		0.071	0.05	0.029	0.016	0.024		0.17	0.26		0.05	0.122	1.029
Transmix ^d	1.060	0.873	0.570	0.040	0.028	0.425	0.599	0.080	0.063	0.229	0.145	0.034	2.342	2.234	8.721

^a All speciation data are presented as wt%.

^b Gasoline speciation is obtained from PERF speciation data for conventional gasoline.

^c Diesel fuel speciation is obtained from PERF speciation data for diesel fuel.

^d Transmix speciation is calculated as a weighted average of gasoline and diesel speciation as shown in Table C-3b.

Table C-9b. Speciated Liquid Weight Fractions a

Species CAS No. Product	1,2,4- Trimethyl benzene 95-63-6 (wt. frac.)	2,2,4- Trimethyl pentane 540-84-1 (wt. frac.)	Benzene 71-43-2 (wt. frac.)	Biphenyl 92-52-4 (wt. frac.)	Cresol 1319-77-3 (wt. frac.)	Ethyl benzene 100-41-4 (wt. frac.)	Hexane (-n) 110-54-3 (wt. frac.)	Isopropyl benzene (cumene) 98-82-8 (wt. frac.)	Methanol 67-56-1 (wt. frac.)	Naphthalene 91-20-3 (wt. frac.)	Phenol 108-95-2 (wt. frac.)	Styrene 100-42-5 (wt. frac.)	Toluene 108-88-3 (wt. frac.)	Xylenes 1330-20-7 (wt. frac.)	Total (wt. frac.)
Gasoline	2.12E-02	1.97E-02	1.29E-02	0.00E+00	0.00E+00	9.26E-03	1.34E-02	1.50E-03	1.43E-03	3.03E-03	0.00E+00	7.80E-04	5.25E-02	4.91E-02	0.185
Diesel No. 2	2.25E-03	1.20E-04	0.00E+00	7.10E-04	5.00E-04	2.90E-04	1.60E-04	2.40E-04	0.00E+00	1.70E-03	2.60E-03	0.00E+00	5.00E-04	1.22E-03	0.010
Transmix	1.06E-02	8.73E-03	5.70E-03	3.97E-04	2.80E-04	4.25E-03	5.99E-03	7.96E-04	6.31E-04	2.29E-03	1.45E-03	3.44E-04	2.34E-02	2.23E-02	0.087

^a All speciation data are presented as weight fractions.

^b Gasoline speciation is obtained from PERF speciation data for conventional gasoline.

^c Diesel fuel speciation is obtained from PERF speciation data for diesel fuel.

^d Transmix speciation is calculated as a weighted average of gasoline and diesel speciation as shown in Table C-3b.

Table C-9c. Chemical Properties by Species a

Properties ^a	1,2,4- Trimethyl benzene 95-63-6	2,2,4- Trimethyl pentane 540-84-1	Benzene 71-43-2	Biphenyl 92-52-4	Cresol 1319-77-3	Ethyl benzene 100-41-4	Hexane (-n) 110-54-3	Isopropyl benzene (cumene) 98-82-8	Methanol 67-56-1	Naphthalene 91-20-3	Phenol 108-95-2	Styrene 100-42-5	Toluene 108-88-3	Xylenes 1330-20-7
Mi	120.19	114.23	78.11	154.21	108.14	106.17	86.18	120.19	32.04	128.17	94.11	104.15	92.14	106.17
A	7.04383	6.8118	6.905	--	7.508	6.975	6.876	6.93666	7.897	7.37	7.133	7.14	6.954	7.009
B	1573.267	1257.84	1211.033	--	1856.36	1424.255	1171.17	1460.793	1474.08	1938.36	1516.79	1574.51	1344.8	1426.266
C	208.56	220.74	220.79	--	199.07	213.21	224.41	207.78	229.13	222.61	174.95	224.09	219.48	215.11
Source ^b	TANKS	TANKS	AP-42	--	AP-42	AP-42	AP-42	AP-42	AP-42	AP-42	AP-42	AP-42	AP-42	AP-42

^a Chemical properties are as follows: Mi = molar mass of species; A, B, C = Antoine equation constants for each species following the form, P (mm Hg) = 10^{A - (B/((T, °C) + C))}

^b Antoine coefficients are obtained from two sources. Coefficients for species marked "TANKS" are based on EPA's database of Antoine coefficients provided with its TANKS 4.0.9d software. Coefficients for species marked "AP-42" are from AP-42 Table 7.1-5. Biphenyl vapor pressure is estimated in Table C-8e from an empirical correlation, so no Antoine coefficients are provided.

Table C-9d. Vapor Speciation Calculations

Mixture Properties ^a				Vapor Weight Fraction Calculations (Z _{i,V}) ^f													Total	
				1,2,4-Trimethyl benzene 95-63-6	2,2,4-Trimethyl pentane 540-84-1	Benzene 71-43-2	Biphenyl ^f 92-52-4	Cresol 1319-77-3	Ethyl benzene 100-41-4	Hexane (-n) 110-54-3	Isopropyl benzene (cumene) 98-82-8	Methanol 67-56-1	Naphthalene 91-20-3	Phenol 108-95-2	Styrene 100-42-5	Toluene 108-88-3		Xylenes 1330-20-7
Gasoline^b	ML	92	P	3.08E-02	8.01E-01	1.55E+00	4.97E-05	2.37E-03	1.55E-01	2.50E+00	7.07E-02	1.99E+00	5.17E-03	4.96E-03	1.03E-01	4.55E-01	1.84E-01	0.017
	MV	60	Pi	5.00E-04	1.27E-02	2.36E-02	0.00E+00	0.00E+00	1.25E-03	3.57E-02	8.12E-05	8.19E-03	1.12E-05	0.00E+00	7.10E-05	2.38E-02	7.84E-03	
	PVA	9.52	xi	1.62E-02	1.58E-02	1.52E-02	0.00E+00	0.00E+00	8.02E-03	1.43E-02	1.15E-03	4.11E-03	2.17E-03	0.00E+00	6.89E-04	5.24E-02	4.26E-02	
	TLA	21.42	yi	5.26E-05	1.33E-03	2.48E-03	0.00E+00	0.00E+00	1.31E-04	3.75E-03	8.53E-06	8.61E-04	1.18E-06	0.00E+00	7.46E-06	2.50E-03	8.24E-04	
	Z _{i,V}			1.05E-04	2.54E-03	3.23E-03	0.00E+00	0.00E+00	2.32E-04	5.39E-03	1.71E-05	4.60E-04	2.52E-06	0.00E+00	1.30E-05	3.85E-03	1.46E-03	
Diesel No. 2^c	ML	188	P	3.08E-02	8.01E-01	1.55E+00	4.97E-05	2.37E-03	1.55E-01	2.50E+00	7.07E-02	1.99E+00	5.17E-03	4.96E-03	1.03E-01	4.55E-01	1.84E-01	0.187
	MV	130	Pi	1.09E-04	1.58E-04	0.00E+00	4.30E-08	2.06E-06	7.97E-05	8.73E-04	2.65E-05	0.00E+00	1.29E-05	2.57E-05	0.00E+00	4.64E-04	3.98E-04	
	PVA	0.00853	xi	3.52E-03	1.97E-04	0.00E+00	8.66E-04	8.69E-04	5.14E-04	3.49E-04	3.75E-04	0.00E+00	2.49E-03	5.19E-03	0.00E+00	1.02E-03	2.16E-03	
	TLA	21.42	yi	1.27E-02	1.86E-02	0.00E+00	5.04E-06	2.42E-04	9.35E-03	1.02E-01	3.11E-03	0.00E+00	1.51E-03	3.02E-03	0.00E+00	5.44E-02	4.67E-02	
	Z _{i,V}			1.18E-02	1.63E-02	0.00E+00	5.98E-06	2.01E-04	7.63E-03	6.79E-02	2.88E-03	0.00E+00	1.49E-03	2.18E-03	0.00E+00	3.86E-02	3.81E-02	
Transmix^d	ML	129	P	3.08E-02	8.01E-01	1.55E+00	4.97E-05	2.37E-03	1.55E-01	2.50E+00	7.07E-02	1.99E+00	5.17E-03	4.96E-03	1.03E-01	4.55E-01	1.84E-01	0.018
	MV	60	Pi	3.50E-04	7.89E-03	1.46E-02	1.65E-08	7.89E-07	7.99E-04	2.24E-02	6.03E-05	5.06E-03	1.19E-05	9.86E-06	4.38E-05	1.49E-02	4.99E-03	
	PVA	5.88	xi	1.14E-02	9.84E-03	9.39E-03	3.31E-04	3.33E-04	5.15E-03	8.95E-03	8.52E-04	2.53E-03	2.30E-03	1.99E-03	4.25E-04	3.27E-02	2.71E-02	
	TLA	21.42	yi	5.96E-05	1.34E-03	2.48E-03	2.80E-09	1.34E-07	1.36E-04	3.81E-03	1.03E-05	8.60E-04	2.02E-06	1.68E-06	7.46E-06	2.53E-03	8.49E-04	
	Z _{i,V}			1.19E-04	2.55E-03	3.23E-03	7.20E-09	2.42E-07	2.41E-04	5.47E-03	2.05E-05	4.59E-04	4.31E-06	2.63E-06	1.29E-05	3.89E-03	1.50E-03	

^a Mixture property nomenclature:

Mi = molecular weight of component i, lb/lb-mole

xi = liquid mole fraction of component i, lb-mole/lb-mole

ML = molecular weight of liquid stock, lb/lb-mole

yi = vapor mole fraction of component i, lb-mole/lb-mole

MV = molecular weight of vapor stock, lb/lb-mole

Z_{i,L} = weight fraction of component i in the liquid, lb/lb

P = vapor pressure of component i at liquid surface temperature, psia

Z_{i,V} = weight fraction of component i in the vapor, lb/lb

Pi = partial pressure of component i, psia

PVA = total vapor pressure of liquid mixture, psia, values interpolated from AP-42 Table 7.1-2

TLA = maximum average liquid surface temperature, degrees C. (for tanks in Pocatello, ID with specular aluminum exterior, per TANKS 4.0.9d)

^b Gasoline liquid and vapor molar masses are obtained from TANKS 4.0.9d. Temperature is the maximum of the 12 months' daily average ambient temperatures at Pocatello, ID, listed in the MET data tables of TANKS 4.0.9d. Vapor pressure of liquid stock at this temperature is calculated in Table C-3d by regression from vapor pressure data available in AP-42, Table 7.1-2.

^c Distillate fuel oil liquid and vapor molar masses are obtained from TANKS 4.0.9d. Temperature is the maximum of the 12 months' daily average ambient temperatures at Pocatello, ID, listed in the MET data tables of TANKS 4.0.9d. Vapor pressure of liquid stock at this temperature is calculated in Table C-3d by regression from vapor pressure data available in AP-42, Table 7.1-2.

^d Transmix liquid and vapor molar masses are obtained from TANKS 4.0.9d. Temperature is the maximum of the 12 months' daily average ambient temperatures at Pocatello, ID, listed in the MET data tables of TANKS 4.0.9d. Vapor pressure of liquid stock at this temperature is calculated in Table C-3d as an average of gasoline and diesel vapor pressures, weighted by the fractions of gasoline and diesel (on a molar basis).

^e Vapor mole fractions (Z_{i,V}) for each species in each product are calculated using the following method based on AP-42 Section 7.1:

$$xi = ((Z_{i,L})(ML))/Mi$$

$$P = (10^{(A - (B/(TLA + C))}))(0.0193368)$$

$$Pi = (P)(xi)$$

$$yi = Pi/PVA$$

$$Z_{i,V} = ((yi)(Mi))/MV = (10^{(A - (B/(TLA + C))}))(0.0193368)(Z_{i,L})(ML)/PVA/MV$$

^f The vapor pressure of biphenyl species is not evaluated with an Antoine equation. Instead, biphenyl vapor pressure as a function of temperature is regressed from saturation curve data presented in Perry's Chemical Engineer's Handbook, 6th ed., Table 3-8, shown in Table C-8e.

Table C-10a. Summary of Annual Facility HAP Emissions by Emission Unit

Emission Sources	VOC Emissions (tpy)	Species CAS No. HAP?	Speciated Emissions (tpy)															HAP Total YES
			1,2,4-Trimethyl benzene 95-63-6 NO	2,2,4-Trimethyl pentane (Isooctane) 540-84-1 YES	Benzene 71-43-2 YES	Biphenyl 92-52-4 YES	Cresol 1319-77-3 YES	Ethanol 64-17-5 NO	Ethyl benzene 100-41-4 YES	Hexane (-n) 110-54-3 YES	Isopropyl Benzene (Cumene) 98-82-8 YES	Methanol 67-56-1 YES	Naphthalene 91-20-3 YES	Phenol 108-95-2 YES	Styrene 100-42-5 YES	Toluene 108-88-3 YES	Xylenes 1330-20-7 YES	
Tank Losses^a																		
All tanks	23.07		8.64E-02	1.34E-01	1.24E-01	6.05E-02	6.06E-02	2.37E-01	7.78E-02	2.49E-01	6.46E-02	6.88E-02	6.34E-02	0.00E+00	6.09E-02	1.99E-01	1.34E-01	1.30
Fugitive Emissions^b																		
Valves Liquid	0.53		5.07E-03	9.24E-03	1.32E-03	5.33E-08	6.54E-05	0.00E+00	3.74E-03	4.12E-02	1.32E-03	1.71E-04	5.87E-04	6.77E-04	4.43E-06	2.07E-02	1.89E-02	0.10
Valves Vapor	0.00		4.00E-05	7.29E-05	1.04E-05	4.20E-10	5.16E-07	0.00E+00	2.95E-05	3.25E-04	1.04E-05	1.35E-06	4.63E-06	5.34E-06	3.49E-08	1.63E-04	1.49E-04	0.00
Fittings Liquid	0.10		9.43E-04	1.72E-03	2.46E-04	9.91E-09	1.22E-05	0.00E+00	6.96E-04	7.66E-03	2.46E-04	3.19E-05	1.09E-04	1.26E-04	8.24E-07	3.84E-03	3.52E-03	0.02
Fittings Vapor	0.04		4.30E-04	7.85E-04	1.12E-04	4.53E-09	5.55E-06	0.00E+00	3.18E-04	3.50E-03	1.12E-04	1.46E-05	4.99E-05	5.75E-05	3.76E-07	1.75E-03	1.61E-03	0.01
Pump Seals Liquid	0.32		3.04E-03	5.55E-03	7.94E-04	3.20E-08	3.93E-05	0.00E+00	2.25E-04	2.47E-02	7.93E-04	1.03E-04	3.53E-04	4.07E-04	2.66E-06	1.24E-02	1.14E-02	0.06
Others Liquid	0.12		1.19E-03	2.16E-03	3.09E-04	1.25E-08	1.53E-05	0.00E+00	8.75E-04	9.64E-03	3.09E-04	4.01E-05	1.37E-04	1.58E-04	1.04E-06	4.83E-03	4.42E-03	0.02
TOTAL	1.11		1.07E-02	1.95E-02	2.80E-03	1.13E-07	1.38E-04	0.00E+00	7.90E-03	8.71E-02	2.79E-03	3.62E-04	1.24E-03	1.43E-03	9.36E-06	4.37E-02	3.99E-02	0.21
Truck Loading Losses^c																		
Gasoline	8.17		4.95E-04	1.57E-02	2.06E-02	0.00E+00	0.00E+00	0.00E+00	1.24E-03	3.57E-02	8.56E-05	2.67E-03	1.09E-05	0.00E+00	6.88E-05	2.25E-02	7.89E-03	0.11
Diesel	0.01		5.55E-05	1.01E-04	0.00E+00	5.83E-10	7.16E-07	0.00E+00	4.09E-05	4.51E-04	1.45E-05	0.00E+00	6.43E-06	7.41E-06	0.00E+00	2.26E-04	2.07E-04	0.00
Transmix	0.03		2.36E-06	6.64E-05	8.62E-05	2.94E-12	3.61E-09	0.00E+00	5.40E-06	1.52E-04	4.32E-07	1.12E-05	7.79E-08	3.73E-08	2.89E-07	9.55E-05	3.42E-05	0.00
TOTAL	8.21		5.53E-04	1.59E-02	2.06E-02	5.86E-10	7.19E-07	0.00E+00	1.28E-03	3.63E-02	1.01E-04	2.68E-03	1.74E-05	7.45E-06	6.91E-05	2.28E-02	8.14E-03	0.11
VCU Stack^d																		
Gasoline	15.47		9.38E-04	2.98E-02	3.89E-02	0.00E+00	0.00E+00	0.00E+00	2.35E-03	6.77E-02	1.62E-04	5.05E-03	2.06E-05	0.00E+00	1.30E-04	4.26E-02	1.50E-02	0.20
Diesel	0.04		3.44E-04	6.27E-04	0.00E+00	3.62E-09	4.44E-06	0.00E+00	2.54E-04	2.80E-03	8.96E-05	0.00E+00	3.98E-05	4.59E-05	0.00E+00	1.40E-03	1.28E-03	0.01
Transmix	0.34		2.37E-05	6.66E-04	8.66E-04	2.95E-11	3.62E-08	0.00E+00	5.42E-05	1.53E-03	4.34E-06	1.12E-04	7.82E-07	3.75E-07	2.90E-06	9.59E-04	3.43E-04	0.00
TOTAL	15.85		1.31E-03	3.10E-02	3.98E-02	3.65E-09	4.47E-06	0.00E+00	2.65E-03	7.20E-02	2.56E-04	5.16E-03	6.12E-05	4.63E-05	1.33E-04	4.50E-02	1.66E-02	0.21
TOTAL FACILITY EMISSIONS	48.24		9.90E-02	2.01E-01	1.87E-01	6.05E-02	6.07E-02	2.37E-01	8.96E-02	4.45E-01	6.78E-02	7.70E-02	6.47E-02	1.48E-03	6.11E-02	3.10E-01	1.98E-01	1.82

^a Tank emissions are computed using AP-42 Chapter 7.1 methods. Emission rates are shown in Table C-5.

^b Fugitive emissions are computed based on the speciation data for liquid and vapor service. The maximum liquid or vapor weight fraction among gasoline, diesel, and transmix is multiplied by the total emission rate for each type of equipment component.

^c Truck loading losses are computed as the product of truck losses in VOC and the vapor weight fraction of the loaded product.

^d VCU stack emissions are computed as the product of total VOC emissions and the vapor weight fraction of the loaded product.

Table C-10b. Annual-Average Liquid and Vapor Speciation Summary Table

Speciation	1,2,4-Trimethyl benzene 95-63-6 (wt frac.)	2,2,4-Trimethyl pentane (Isooctane) 540-84-1 (wt frac.)	Benzene 71-43-2 (wt frac.)	Biphenyl 92-52-4 (wt frac.)	Cresol 1319-77-3 (wt frac.)	Ethanol 64-17-5 (wt frac.)	Ethyl benzene 100-41-4 (wt frac.)	Hexane (-n) 110-54-3 (wt frac.)	Isopropyl Benzene (Cumene) 98-82-8 (wt frac.)	Methanol 67-56-1 (wt frac.)	Naphthalene 91-20-3 (wt frac.)	Phenol 108-95-2 (wt frac.)	Styrene 100-42-5 (wt frac.)	Toluene 108-88-3 (wt frac.)	Xylenes 1330-20-7 (wt frac.)
Gasoline Liquid Weight Fraction	2.12E-02	1.97E-02	1.29E-02				9.26E-03	1.34E-02	1.50E-03	1.43E-03	3.03E-03		7.80E-04	5.25E-02	4.91E-02
Gasoline Vapor Weight Fraction	6.06E-05	1.92E-03	2.52E-03				1.52E-04	4.38E-03	1.05E-05	3.26E-04	1.33E-06		8.43E-06	2.75E-03	9.67E-04
Diesel Liquid Weight Fraction	2.25E-03	1.20E-04		7.10E-04	5.00E-04		2.90E-04	1.60E-04	2.40E-04		1.70E-03	2.60E-03		5.00E-04	1.22E-03
Diesel Vapor Weight Fraction	9.65E-03	1.76E-02		1.01E-07	1.24E-04		7.12E-03	7.84E-02	2.51E-03		1.12E-03	1.29E-03		3.93E-02	3.60E-02
Transmix Liquid Weight Fraction	1.06E-02	8.73E-03	5.70E-03	3.97E-04	2.80E-04		4.25E-03	5.99E-03	7.96E-04	6.31E-04	2.29E-03	1.45E-03	3.44E-04	2.34E-02	2.23E-02
Transmix Vapor Weight Fraction	6.87E-05	1.94E-03	2.52E-03	8.58E-11	1.05E-07		1.58E-04	4.44E-03	1.26E-05	3.26E-04	2.27E-06	1.09E-06	8.42E-06	2.79E-03	9.96E-04
Maximum Liquid Weight Fraction ^a	2.12E-02	1.97E-02	1.29E-02	7.10E-04	5.00E-04		9.26E-03	1.34E-02	1.50E-03	1.43E-03	3.03E-03	2.60E-03	7.80E-04	5.25E-02	4.91E-02
Maximum Vapor Weight Fraction ^b	9.65E-03	1.76E-02	2.52E-03	1.01E-07	1.24E-04		7.12E-03	7.84E-02	2.51E-03	3.26E-04	1.12E-03	1.29E-03	8.43E-06	3.93E-02	3.60E-02

^a Maximum liquid and vapor weight fractions are the maximum fractions of gasoline, transmix, and diesel.

Table C-11. Facilitywide GHG Emissions, Calculated in CO2 Equivalents (CO2e) a

Species	Captured VOC (tpy)	Vapor Molar Mass (lb/lbmol)	Fuel Consumption ^b (MMscf/yr)	Heating Value ^c (Btu/scf)	Maximum Annual Heat Input (MMBtu/yr)	CO ₂ Emission Factor ^d (kg/MMBtu)	CO ₂ Emission Rate (kg/yr)	CH ₄ Emission Factor ^d (kg/MMBtu)	CH ₄ Emission Rate (kg/yr)	N ₂ O Emission Factor ^d (kg/MMBtu)	N ₂ O Emission Rate (kg/yr)	Total Emission Rate ^e (kg/yr CO ₂ e) (tpy CO ₂ e)	
VCU Stack													
Gasoline	1020.85	60	12.58	1,388	17,458	59.00	1.03E+06	1.00E-03	1.75E+01	1.00E-04	1.75E+00	1.03E+06	1136.43
Diesel	0.72	130	0.00	1,388	6	59.00	3.35E+02	1.00E-03	5.67E-03	1.00E-04	5.67E-04	3.35E+02	0.37
Transmix	4.29	60	0.05	1,388	73	59.00	4.32E+03	1.00E-03	7.32E-02	1.00E-04	7.32E-03	4.33E+03	4.77
VCU Pilot			0.50	1,020	510	53.02	2.70E+04	1.00E-03	5.10E-01	1.00E-04	5.10E-02	2.71E+04	29.84
Other Combustion Sources													
Space Heater					919.80	53.02	4.88E+04	1.00E-03	9.20E-01	1.00E-04	9.20E-02	4.88E+04	53.81
TOTAL			13.13		18,967		1.11E+06		1.90E+01		1.90E+00	1.11E+06	1,225.22

^a Combusted VOC is conservatively assumed to be 100% of VOC captured at the loading rack. Captured VOC is the product of the uncontrolled emission factor and maximum throughput of each product, as shown below, and at Table C-7:

	EF, lb/Mgal	TP, Mgal/yr
Gasoline	5.51	370,801
Diesel	0.008	191,453
Transmix	3.40	2,520

^b VOC fuel consumption at the loading rack in MMscf is calculated according to the following formula:

$$(\text{VOC captured, tpy}) * (2000 \text{ lb/ton}) / (\text{molar mass, lb/lbmol}) * (0.73 \text{ scf atm/lbmol } ^\circ\text{R}) (\text{loading temperature, } ^\circ\text{R}) / (1 \text{ atm}) * (1 \text{ MMscf}/1,000,000 \text{ scf}) = (\text{VOC combusted, MMscf/yr})$$

^c It is assumed that VOC combusted at the VCU has a heating value similar to that of refinery fuel gas, due to the presence of hydrocarbons larger than methane in the vapor stream. The heating value presented here is the default higher heating value for fuel gas specified in Table C-1 to 40 CFR 98.

^d CO₂ emission factor for fuel gas obtained from Table C-1 in 40 CFR 98 Subpart C. Table C-2 does not list CH₄ and N₂O emission factors for fuel gas. Therefore, factors for natural gas are used.

^e VCU combusts VOC vapors captured at the loading rack, as well as natural gas.

$$\text{Emission rate, kg/yr CO}_2\text{e} = (\text{CO}_2 \text{ emission rate, kg/yr}) * (1 \text{ kg CO}_2\text{e} / \text{kg CO}_2) + (\text{CH}_4 \text{ emission rate, kg/yr}) * (21 \text{ kg CO}_2\text{e} / \text{kg CH}_4) + (\text{N}_2\text{O emission rate, kg/yr}) * (310 \text{ kg CO}_2\text{e} / \text{kg N}_2\text{O})$$

Conversions to CO₂e are found in Table A-1 in 40 CFR 98 Subpart C, which gives the 100-year global warming potentials for each species using CO₂ as a reference species.

Table C-12a. Pre/Post-Project Space Heater Combustion Duty

Quantity	Furnaces and Heaters ^a
Furnace 1 Heat Input, Btu/hr	105,000
Maximum Heat Input, Btu/hr	105,000
Operating Hours, hr/yr	8,760
Natural Gas Higher Heating Value, BTU/scf	1,020
Maximum Fuel Consumption, MMscf/yr	0.90

^a The Pocatello facility operates only one gas-fired space heater. Other heaters are electric.

Table C-12b. Pre/Post-Project Loading Vapor Production (Annual)

	Captured VOC ^a (tpy)	Vapor Molar Mass (lb/lbmol)	Fuel Consumption ^b (MMscf/yr)
VCU Stack			
Gasoline	1,020.85	60	12.58
Diesel	0.72	130	0.00
Transmix	4.29	60	0.05
VCU Pilot ^c			0.50
Total			13.13
Other Combustion Sources			
Space Heaters, Furnaces ^d			0.90
TOTAL			14.04

^a Combusted VOC is conservatively assumed to be 100% of VOC captured at the loading rack. Captured VOC is the product of the uncontrolled emission factor and maximum throughput of each product, as shown below:

	EF, lb/Mgal	TP, Mgal/yr
Gasoline	5.51	370,801
Diesel	0.01	191,453
Transmix	3.40	2,520

^b Vapors combusted in MMscf/yr calculated as:

$$(\text{tpy VOC}) * (2,000 \text{ lb/ton}) * (\text{vapor MW, in lb VOC/lbmol VOC}) * R (\text{scf atm/lbmol } ^\circ\text{R})$$

* Annual average temperature ($^\circ\text{R}$) / 1 atm

R (Ideal Gas Constant)	0.73	scf atm/lbmol $^\circ\text{R}$
Temperature	506	$^\circ\text{R}$

^c VCU pilot is based on scf natural gas listed in technical specifications for the unit of:
0.50 MMscf/yr

^d Space heater consumption calculated in Table C-12a above.

Table C-13. Natural Gas Combustion PTE - VOC and HAPs

Pollutant ^a	CAS No.	Emission Factor ^b (lb/MMscf)	VCU Emissions ^{c,d} (tpy)	Heater Emissions ^d (tpy)	Totals (tpy)
NO _x		1.00E+02	--	4.51E-02	4.51E-02
CO		8.40E+01	--	3.79E-02	3.79E-02
PM ₁₀		7.60E+00	--	3.43E-03	3.43E-03
PM _{2.5}		7.60E+00	--	3.43E-03	3.43E-03
SO ₂		6.00E-01	--	2.71E-04	2.71E-04
VOC		5.50E+00	--	2.48E-03	2.48E-03
Lead		5.00E-04	3.28E-06	2.25E-07	3.51E-06
2-Methylnaphthalene	91-57-6	2.40E-05	1.58E-07	1.08E-08	1.68E-07
3-Methylchloranthrene	56-49-5	1.80E-06	1.18E-08	8.12E-10	1.26E-08
7,12-Dimethylbenz(a)anthracene	57-97-6	1.60E-05	1.05E-07	7.21E-09	1.12E-07
Acenaphthene	83-32-9	1.80E-06	1.18E-08	8.12E-10	1.26E-08
Acenaphthylene	203-96-8	1.80E-06	1.18E-08	8.12E-10	1.26E-08
Anthracene	120-12-7	2.40E-06	1.58E-08	1.08E-09	1.68E-08
Benz(a)anthracene	56-55-3	1.80E-06	1.18E-08	8.12E-10	1.26E-08
Benzene	71-43-2	2.10E-03	1.38E-05	9.47E-07	1.47E-05
Benzo(a)pyrene	50-32-8	1.20E-06	7.88E-09	5.41E-10	8.42E-09
Benzo(b)fluoranthene	205-99-2	1.80E-06	1.18E-08	8.12E-10	1.26E-08
Benzo(g,h,i)perylene	191-24-2	1.20E-06	7.88E-09	5.41E-10	8.42E-09
Benzo(k)fluoranthene	205-82-3	1.80E-06	1.18E-08	8.12E-10	1.26E-08
Chrysene	218-01-9	1.80E-06	1.18E-08	8.12E-10	1.26E-08
Dibenzo(a,h)anthracene	53-70-3	1.20E-06	7.88E-09	5.41E-10	8.42E-09
Dichlorobenzene	25321-22-6	1.20E-03	7.88E-06	5.41E-07	8.42E-06
Fluoranthene	206-44-0	3.00E-06	1.97E-08	1.35E-09	2.11E-08
Fluorene	86-73-7	2.80E-06	1.84E-08	1.26E-09	1.97E-08
Formaldehyde	50-00-0	7.50E-02	4.93E-04	3.38E-05	5.26E-04
Hexane	110-54-3	1.80E+00	1.18E-02	8.12E-04	1.26E-02
Indeno(1,2,3-cd)pyrene	193-39-5	1.80E-06	1.18E-08	8.12E-10	1.26E-08
Naphthalene	91-20-3	6.10E-04	4.01E-06	2.75E-07	4.28E-06
Phenanathrene	85-01-8	1.70E-05	1.12E-07	7.67E-09	1.19E-07
Pyrene	129-00-0	5.00E-06	3.28E-08	2.25E-09	3.51E-08
Toluene	108-88-3	3.40E-03	2.23E-05	1.53E-06	2.39E-05
Arsenic	7440-38-2	2.00E-04	1.31E-06	9.02E-08	1.40E-06
Beryllium	7440-41-7	1.20E-05	7.88E-08	5.41E-09	8.42E-08
Cadmium	7440-43-9	1.10E-03	7.22E-06	4.96E-07	7.72E-06
Chromium	7440-47-3	1.40E-03	9.19E-06	6.31E-07	9.83E-06
Cobalt	7440-48-4	8.40E-05	5.52E-07	3.79E-08	5.90E-07
Manganese	7439-96-5	3.80E-04	2.50E-06	1.71E-07	2.67E-06
Mercury	7439-97-6	2.60E-04	1.71E-06	1.17E-07	1.82E-06
Nickel	7440-02-0	2.10E-03	1.38E-05	9.47E-07	1.47E-05
Selenium	7782-49-2	2.40E-05	1.58E-07	1.08E-08	1.68E-07
TOTAL HAP		1.89E+00	1.24E-02	8.51E-04	1.33E-02

^a This PTC action seeks synthetic minor limits without proposing any physical changes or changes to the method of operation. The PTE represented here is the total PTE of each unit.

^b Emission factors from AP-42, Section 1.4, Combustion of Natural Gas (7/98).

^c Emissions of NO_x, CO, VOC, PM, and SO₂ are calculated for the VCU based on the factors and methods in Table C-7a and C-7b.

^d Emission calculation is as follows: Emissions, tpy = (Fuel consumption, MMscf/yr) (Emission factor, lb/MMscf) / (2,000 lb/ton)

VCU, MMscf/yr combustion rate: 13.13 MMscf/yr (includes captured loading vapors)
 NG combustion sources, MMscf/yr combustion rate: 0.90 MMscf/yr

Table C-14a. Temperature Correction for Short-Term Loading Emission Factors

Quantity	UOM	Product Loading Rack		
		Gasoline Loading	Diesel Loading	Transmix Loading
VOC Uncontrolled Annual Emission Factor ^a	lb/gal	5.51E-03	7.51E-06	3.40E-03
Annual Average Temperature	°R	506	506	506
Maximum Daily Average Temperature	°R	530	530	530
Annual Average Vapor Pressure	psia	6.2	0.0039	3.837
Maximum Daily Average Vapor Pressure	psia	9.5	0.0085	5.876
VOC Uncontrolled Short-Term Emission Factor ^a	lb/gal	8.05E-03	1.56E-05	4.97E-03
VOC VCU Stack Short-Term Emission Factor ^b	lb/gal	8.34E-05	7.75E-07	2.47E-04
VOC Fugitive Short-Term Emission Factor ^b	lb/gal	6.44E-05	1.25E-07	3.98E-05

^a Annual loading emission factors for VOC are calculated in Table C-7 using Equation 1 of AP-42 Section 5.2.

Equation 1 is $L = 12.46 * S * P * M / T * (1 - \text{eff} / 100)$

Of these terms, the vapor pressure P and the average loading temperature T vary depending on whether T is evaluated for an annual average or for a short-term daily average.

Therefore, to correct the emission factor L for use as a short-term emission factor, the annual factor is divided by the ratio (P / T) using the annual values in Table C-7, and multiplied by the same ratio (P / T) for short-term values using the vapor pressures below interpolated from AP-42 Table 7.1-2:

$$P_{\text{Gasoline RVP15}} = 9.52$$

$$P_{\text{Distillate \# 2}} = 0.0085$$

$$P_{\text{Transmix}} = 5.876$$

^b Capture efficiency and control efficiencies are given in Table C-7 and are applied here as well.

Loading rack fugitive emissions = (Loading emissions) * (1 - capture eff.)

VCU stack emissions = (Loading emissions) * (capture eff.) * (1 - control eff.)

Exception to the above: the VCU stack emissions are limited in mg/L for gasoline loading.

$$\text{Capture eff.} = 99.2\%$$

$$\text{Control eff.} = 95\%$$

$$\text{Emission limit} = 10 \text{ mg/L}$$

Table C-14b. Short-Term Emissions of Criteria Pollutants from the VCU

Product	Quantity Loaded ^a	VOC Emission Factor ^{b,c}		VOC Emissions ^d	Percent Hourly Uptime ^a	Hourly Throughput ^a
	(gpm)	(mg/L)	(lb/gal)			
Gasoline	5,500	10	8.35E-05	27.5	75%	247,500
Diesel	3,300		7.75E-07	0.2	75%	148,500
Transmix	550		2.47E-04	8.1	75%	24,750
Total	9,350			35.84		

^a The short-term emissions from loading rack and VCU are based on the maximum loading rates of the loading rack.

75% For NO_x and CO calculations on an hourly basis, this percent uptime of pumps is applied to allow for truck ingress/egress from the l

^b Permit T1-050032, Condition 3.2, stipulates that TOC emissions from the VCU shall not exceed 10 milligrams per liter of liquid throughput into gasoline tank trucks, per 40 CFR 60.502(b). Diesel fuel, jet kerosene, and transmix do not meet the definition of gasoline, so the AP-42 loading equation in footnote 'b' of Table C-7 is used for these liquids.

^c Loading emission factors for diesel fuel and transmix are calculated using Equation 1 in AP-42, Section 5.2, Transportation and Marketing of Petroleum Liquids, dated July 2008. Calculations are also presented in Table C-14a.

S =	0.6	Saturation factor for tank trucks, submerged loading, normal service. AP-42 Table 5.2-1, 6/08.
P _{Distillate # 2} =	0.0085	(psia) True vapor pressure calculated based on data for Distillate Fuel Oil No. 2 provided in AP-42, Section 7, Table 7.1-2, dated November 2006 (see Table C-3d).
M _{Distillate # 2} =	130	(lb/lbmol) Molecular weight of Distillate Fuel Oil No. 2 vapor at 60 F (AP-42, Section 7, Table 7.1-2, dated November 2006)
P _{Gasoline RVP15} =	9.52	(psia) True vapor pressure calculated based on data for Gasoline RVP 15 (see Table C-3d).
M _{Gasoline RVP15} =	60	(lb/lbmol) Molecular weight of Gasoline RVP 15 vapor at 60 F (AP-42, Section 7, Table 7.1-2, dated November 2006)
P _{Transmix} =	5.876	(psia) True vapor pressure interpolated based on data for Gasoline RVP 15 and diesel fuel provided in AP-42, Section 7, Table 7.1-2, dated November 2006. See Table C-3d for calculations.
M _{Transmix} =	60	(lb/lbmol) Molecular weight of transmix vapor at 60 F. See Table C-3c for calculations.
T =	530	(°R) Maximum Month's Average of Daily Average Ambient Temperatures for Pocatello, ID, from EPA's TANKS 4.0.9d meteorology data tables.
eff =	0.95	Assumed average control efficiency for VCU per AP-42, Section 5.2, page 5.2-6 (range provided between 90-99%). Efficiency is used for diesel fuel and transmix.

^d Emissions of VOC from the loading rack are calculated as: (loading rate, gpm) * (emission factor, lb/Mgal) (Mgal / 1,000 gal) (60 min/hr)

Table C-14c. Calculated Short-Term Fuel Combustion at the VCU in scf

	Captured VOC^a (lb/hr)	Vapor Molar Mass^b (lb/lbmol)	Vapor Combustion^c (MMscf/hr)
Gasoline	2656.65	60	1.71E-02
Diesel	3.10	130	9.22E-06
Transmix	164.11	60	1.06E-03
VCU Pilot			5.71E-05
TOTAL			1.83E-02

^a Per AP-42, Chapter 5, section 5.2.2.1.1 page 5.2-6, not all of the displaced vapors reach the control device because of leakage from both the tank truck and collection system. The following "uncontrolled" loading emission factors are calculated in Table C-14a, from AP-42 Equation 1 used above. These factors are used to determine the rate of VOC capture in lb/hr.

EF _{Uncontrolled} =	8.05E-03	(lb/gal) Uncontrolled Organic Emission Factor for Gasoline, submerged loading
EF _{Uncontrolled} =	1.56E-05	(lb/gal) Uncontrolled Organic Emission Factor for Distillate Oil No.2 for Tank-Trucks
EF _{Uncontrolled} =	4.97E-03	(lb/gal) Uncontrolled Organic Emission Factor for Transmix for Tank-Trucks

^b Vapor molar masses provided in AP-42 Table 7.1-2.

^c Fuel combustion rate in MMscf/hr is calculated so that speciated combustion emissions may be estimated using AP-42 factors. The VCU pilot has a maximum combustion rate of 0.5 MMscf/yr, which is a constant flow rate converted to MMscf/hr by dividing by 8,760. Loading vapor flow rates (lb/hr) are converted to MMscf/hr using the equation:

$$\text{Flow rate, MMscf/hr} = \text{flow rate, lb/hr} * (\text{molar mass, lb/lbmol of vapors})^{-1} * 0.73 (\text{scf atm} / \text{lbmol} \cdot \text{°R}) / 1 \text{ atm} * 511 \text{ °R} / 10^6$$

Table C-14d. Truck Loading Rack and VCU - Short-Term Emissions Using MMBtu/hr Threshold

Variable	Value	Units of Measure
Flow of VOC Vapors from Rack ^a	18,263	scf/hr at 46.68 °F
Molar Gas Constant	0.73	atm ft ³ / lbmol °R
Molar Flow of Hydrocarbon to VCU ^b	0.00	mol/s hydrocarbons as C ₄ H ₁₀
HHV as Butane ^c	2,877.6	kJ/mol HHV
Maximum Heat Input Rate to VCU	61.12	MMBtu/hr HHV
Emission Factors ^a		
(lb/MMBtu)	Emissions	(lb/hr)
PM	7.84E-03	0.48
PM ₁₀	7.84E-03	0.48
PM _{2.5}	7.84E-03	0.48
SO ₂ ^e	5.58E-04	0.03
NO _x	1.47E-01	8.99
CO	8.24E-02	5.03

^a Based on the calculated uncontrolled vapor emissions of the maximum short-term throughput of each product.

^b Calculated as: (vapor flow, acf/min)*(vol% HC as propane, vol%)/(0.7302 atm ft³ / lbmol °R)*(1 atm)/(0 °F + 459.67 F°)*(453.5924 g/lb)/(60 s/min)

^c Per CRC Handbook of Chemistry and Physics, 86th Edition, p. 5-70.

^d Emission factors from AP-42, Section 1.5, external combustion of butane vapors, Tables 1.5-1, converted to lb/MMBtu using the 102 x 10⁶ BTU/10³ gal basis on which the AP-42 factors are based.

^e The emission factor in AP-42, Section 1.5 for SO₂ is (0.09)*(S) lb/10³ gal fuel combusted, where S is the sulfur content of the fuel in gr/100 ft³. A sulfur content of 0.59 gr / 100 scf is calculated, based on a very conservative assumption that 100% of sulfur in gasoline is vaporized.

Gasoline sulfur content:	80	ppmwt based on federal EPA Tier 2 cap for gasoline sulfur
Density of gasoline:	5.6	lb/gal
Vapors generated during loading:	8.05E-03	lb vapors / gal loaded
Gasoline vapor molar mass	60.00	lb / lbmol
Temperature	506.35	°R
Gasoline Vapor Mass	0.16	lb vapor / scf vapor
Gasoline Vapor Concentration of Sulfur	9.03E-03	lb S / scf vapor
Gasoline Vapor Concentration of Sulfur	0.63	gr S / 100 scf vapor

Table C-15. Speciated Short-Term Combustion Emissions

	CAS No.	Emission Factor ^a (lb/MMscf)	VCU Emissions ^b (lb/hr)	Space Heater Emissions ^c (lb/hr)
PM ₁₀	--	7.60E+00	--	7.82E-04
PM _{2.5}	--	7.60E+00	--	7.82E-04
SO ₂	--	6.00E-01	--	6.18E-05
2-Methylnaphthalene	91-57-6	2.40E-05	4.38E-07	2.47E-09
3-Methylchloranthrene	56-49-5	1.80E-06	3.29E-08	1.85E-10
7,12-Dimethylbenz(a)anthracene	57-97-6	1.60E-05	2.92E-07	1.65E-09
Acenaphthene	83-32-9	1.80E-06	3.29E-08	1.85E-10
Acenaphthylene	203-96-8	1.80E-06	3.29E-08	1.85E-10
Anthracene	120-12-7	2.40E-06	4.38E-08	2.47E-10
Benz(a)anthracene	56-55-3	1.80E-06	3.29E-08	1.85E-10
Benzene	71-43-2	2.10E-03	3.84E-05	2.16E-07
Benzo(a)pyrene	50-32-8	1.20E-06	2.19E-08	1.24E-10
Benzo(b)fluoranthene	205-99-2	1.80E-06	3.29E-08	1.85E-10
Benzo(g,h,i)perylene	191-24-2	1.20E-06	2.19E-08	1.24E-10
Benzo(k)fluoranthene	205-82-3	1.80E-06	3.29E-08	1.85E-10
Chrysene	218-01-9	1.80E-06	3.29E-08	1.85E-10
Dibenzo(a,h)anthracene	53-70-3	1.20E-06	2.19E-08	1.24E-10
Dichlorobenzene	25321-22-6	1.20E-03	2.19E-05	1.24E-07
Fluoranthene	206-44-0	3.00E-06	5.48E-08	3.09E-10
Fluorene	86-73-7	2.80E-06	5.11E-08	2.88E-10
Formaldehyde	50-00-0	7.50E-02	1.37E-03	7.72E-06
Hexane	110-54-3	1.80E+00	3.29E-02	1.85E-04
Indeno(1,2,3-cd)pyrene	193-39-5	1.80E-06	3.29E-08	1.85E-10
Naphthalene	91-20-3	6.10E-04	1.11E-05	6.28E-08
Nitrous Oxide	10024-97-2	3.06E-01	5.59E-03	3.15E-05
Phenanathrene	85-01-8	1.70E-05	3.10E-07	1.75E-09
Pyrene	129-00-0	5.00E-06	9.13E-08	5.15E-10
Toluene	108-88-3	3.40E-03	6.21E-05	3.50E-07
Arsenic	7440-38-2	2.00E-04	3.65E-06	2.06E-08
Beryllium	7440-41-7	1.20E-05	2.19E-07	1.24E-09
Cadmium	7440-43-9	1.10E-03	2.01E-05	1.13E-07
Chromium	7440-47-3	1.40E-03	2.56E-05	1.44E-07
Cobalt	7440-48-4	8.40E-05	1.53E-06	8.65E-09
Manganese	7439-96-5	3.80E-04	6.94E-06	3.91E-08
Mercury	7439-97-6	2.60E-04	4.75E-06	2.68E-08
Nickel	7440-02-0	2.10E-03	3.84E-05	2.16E-07
Selenium	7782-49-2	2.40E-05	4.38E-07	2.47E-09

^a Emission factor for nitrous oxide from 40 CFR 98 Subpart C, Table C-2. Converted to lb/MMscf from kg/MMBtu using the HHV of 1,388 Btu/scf for fuel gas. Other emission factors from AP-42, Section 1.4, Combustion of Natural Gas (7/98).

^b VCU MMscfh combustion rate: 1.83E-02 as calculated in Table C-14c.

^c Space heater MMscfh combustion rate: 1.03E-04 as shown in Table C-13.

Table C-16a. VCU Stack, Speciated Emissions from Uncombusted Vapor

Pollutant		Gasoline Loading Emission Factor (lb/gal)	Diesel Loading Emission Factor (lb/gal)	Transmix Loading Emission Factor (lb/gal)	
VOC		8.34E-05	7.75E-07	2.47E-04	
Pollutant	CAS No.	Gasoline Loading Emission Factor (lb/gal)	Diesel Loading Emission Factor (lb/gal)	Transmix Loading Emission Factor (lb/gal)	Emissions (lb/hr)
1,2,4-Trimethylbenzene	95-63-6	8.79E-09	9.13E-09	2.94E-08	5.68E-03
2,2,4-Trimethylpentane	540-84-1	2.12E-07	1.26E-08	6.30E-07	9.32E-02
Benzene	71-43-2	2.70E-07	0.00E+00	7.97E-07	1.15E-01
Biphenyl	92-52-4	0.00E+00	4.64E-12	1.78E-12	9.77E-07
Cresols	1319-77-3	0.00E+00	1.56E-10	5.97E-11	3.28E-05
Ethylbenzene	100-41-4	1.93E-08	5.92E-09	5.94E-08	9.51E-03
Hexane (-n)	110-54-3	4.50E-07	5.26E-08	1.35E-06	2.03E-01
Isopropyl benzene (cumene)	98-82-8	1.43E-09	2.23E-09	5.07E-09	1.08E-03
Methanol	67-56-1	3.84E-08	0.00E+00	1.13E-07	1.64E-02
Naphthalene	91-20-3	2.10E-10	1.15E-09	1.06E-09	3.33E-04
Phenol	108-95-2	0.00E+00	1.69E-09	6.49E-10	3.57E-04
Styrene	100-42-5	1.08E-09	0.00E+00	3.19E-09	4.62E-04
Toluene	108-88-3	3.21E-07	2.99E-08	9.59E-07	1.44E-01
Xylenes	1330-20-7	1.22E-07	2.95E-08	3.71E-07	5.82E-02

^a Loading emission factors for VOC are calculated in Table C-14a.

^b Speciated emission factors are calculated as the product of the VOC emission factor and the vapor speciation presented in Table C-9d.

^c Speciated emissions are the sum of the products of the loading rates presented in Table C-14b (shown below) with the emission factors shown in this table. Speciated emissions are summed across all products for a maximum worst-case hourly emission rate.

Gasoline	5,500	gpm
Diesel	3,300	gpm
Transmix	550	gpm

Table C-16b. Product Loading Rack Short-Term Speciated Fugitive Emissions

Pollutant		Gasoline Loading Emission Factor (lb/gal)	Diesel Loading Emission Factor (lb/gal)	Transmix Loading Emission Factor (lb/gal)	
VOC - Controlled		6.44E-05	1.25E-07	3.98E-05	
Pollutant	CAS No.	Gasoline Loading Emission Factor (lb/gal)	Diesel Loading Emission Factor (lb/gal)	Transmix Loading Emission Factor (lb/gal)	Emissions (lb/hr)
1,2,4-Trimethylbenzene	95-63-6	6.78E-09	1.47E-09	4.75E-09	2.69E-03
2,2,4-Trimethylpentane	540-84-1	1.63E-07	2.04E-09	1.02E-07	5.77E-02
Benzene	71-43-2	2.08E-07	0.00E+00	1.29E-07	7.30E-02
Biphenyl	92-52-4	0.00E+00	7.48E-13	2.86E-13	1.58E-07
Cresols	1319-77-3	0.00E+00	2.51E-11	9.63E-12	5.30E-06
Ethylbenzene	100-41-4	1.49E-08	9.55E-10	9.57E-09	5.43E-03
Hexane (-n)	110-54-3	3.47E-07	8.49E-09	2.18E-07	1.23E-01
Isopropyl benzene (cumene)	98-82-8	1.10E-09	3.60E-10	8.17E-10	4.61E-04
Methanol	67-56-1	2.96E-08	0.00E+00	1.83E-08	1.04E-02
Naphthalene	91-20-3	1.62E-10	1.86E-10	1.72E-10	9.61E-05
Phenol	108-95-2	0.00E+00	2.73E-10	1.05E-10	5.76E-05
Styrene	100-42-5	8.34E-10	0.00E+00	5.15E-10	2.92E-04
Toluene	108-88-3	2.48E-07	4.82E-09	1.55E-07	8.78E-02
Xylenes	1330-20-7	9.39E-08	4.77E-09	5.98E-08	3.39E-02

^a Loading emission factors for VOC are listed in Table C-14a.

^b Speciated emission factors are calculated as the product of the VOC emission factor and the vapor speciation presented in Table C-9d.

^c Speciated emissions are the sum of the products of the loading rates presented in Table C-14b (shown below) with the emission factors shown in this table. Speciated emissions are summed across all products for a maximum worst-case hourly emission rate.

Gasoline	5,500	gpm
Diesel	3,300	gpm
Transmix	550	gpm

Table C-17a. Toxic Air Pollutant Threshold Comparisons

Pollutant	CAS No.	Loading Rack Fugitive Emissions ^a (lb/hr)	VCU Stack Emissions ^b (lb/hr)	Small Heater Emissions ^b (lb/hr)
1,2,4-Trimethylbenzene	95-63-6	2.69E-03	5.68E-03	0.00E+00
2,2,4-Trimethylpentane	540-84-1	5.77E-02	9.32E-02	0.00E+00
Benzene	71-43-2	7.30E-02	1.15E-01	2.16E-07
Biphenyl	92-52-4	1.58E-07	9.77E-07	0.00E+00
Cresols	1319-77-3	5.30E-06	3.28E-05	0.00E+00
Ethylbenzene	100-41-4	5.43E-03	9.51E-03	0.00E+00
Hexane (-n)	110-54-3	1.23E-01	2.36E-01	1.85E-04
Isopropyl benzene (cumene)	98-82-8	4.61E-04	1.08E-03	0.00E+00
Methanol	67-56-1	1.04E-02	1.64E-02	0.00E+00
Naphthalene	91-20-3	9.61E-05	3.44E-04	6.28E-08
Naphthalene	91-20-3	9.61E-05	3.44E-04	6.28E-08
Phenol	108-95-2	5.76E-05	3.57E-04	0.00E+00
Styrene	100-42-5	2.92E-04	4.62E-04	0.00E+00
Toluene	108-88-3	8.78E-02	1.44E-01	3.50E-07
Xylenes	1330-20-7	3.39E-02	5.82E-02	0.00E+00
Dichlorobenzene	25321-22-6	--	2.19E-05	1.24E-07
Formaldehyde	50-00-0	--	1.37E-03	7.72E-06
Nitrous Oxide	10024-97-2	--	5.59E-03	3.15E-05
Arsenic	7440-38-2	--	3.65E-06	2.06E-08
Beryllium	7440-41-7	--	2.19E-07	1.24E-09
Cadmium	7440-43-9	--	2.01E-05	1.13E-07
Chromium	7440-47-3	--	2.56E-05	1.44E-07
Cobalt	7440-48-4	--	1.53E-06	8.65E-09
Manganese	7439-96-5	--	6.94E-06	3.91E-08
Mercury	7439-97-6	--	4.75E-06	2.68E-08
Nickel	7440-02-0	--	3.84E-05	2.16E-07
Selenium	7782-49-2	--	4.38E-07	2.47E-09
7-PAH			2.08E-07	1.17E-09
Benz(a)anthracene	56-55-3	--	3.29E-08	1.85E-10
Benzo(a)pyrene	50-32-8	--	2.19E-08	1.24E-10
Benzo(b)fluoranthene	205-99-2	--	3.29E-08	1.85E-10
Benzo(k)fluoranthene	205-82-3	--	3.29E-08	1.85E-10
Dibenzo(a,h)anthracene	53-70-3	--	2.19E-08	1.24E-10
Chrysene	218-01-9	--	3.29E-08	1.85E-10
Indeno(1,2,3-cd)pyrene	193-39-5	--	3.29E-08	1.85E-10
Other PAH			1.40E-06	7.91E-09
2-Methylnaphthalene	91-57-6	--	4.38E-07	2.47E-09
7,12-Dimethylbenz(a)anthracene	57-97-6	--	2.92E-07	1.65E-09
Benzo(g,h,i)perylene	191-24-2	--	2.19E-08	1.24E-10
3-Methylcholanthrene	56-49-5	--	3.29E-08	1.85E-10
Acenaphthene	83-32-9	--	3.29E-08	1.85E-10
Acenaphthylene	203-96-8	--	3.29E-08	1.85E-10
Anthracene	120-12-7	--	4.38E-08	2.47E-10
Fluoranthene	206-44-0	--	5.48E-08	3.09E-10
Fluorene	86-73-7	--	5.11E-08	2.88E-10
Phenanthrene	85-01-8	--	3.10E-07	1.75E-09
Pyrene	129-00-0	--	9.13E-08	5.15E-10

^a Product loading rack short-term emissions are calculated in Table C-16b.

^b Short-term emissions from the VCU stack are computed in Tables C-15 and C-16a. The sum for each pollutant of emission rates in Tables C-15 and C-16a is presented here.

^c Screening emission levels and Allowable Ambient Concentrations (AACs) are given in Sections 585 and 586 of IDAPA 58.01.01. The EL for naphthalene is set to the PAH EL and annual averaging period, based on correspondence with Cheryl Robinson, July 2, 2014. The compliance strategy taken for each TAP is as follows:

Benzene: Gasoline is the only petroleum product containing benzene emissions (diesel and jet products do not contain appreciable amounts of benzene). Benzene emissions from gasoline storage tanks, gasoline loading, and leaks from equipment in gasoline service are regulated under NESHAP Subpart BBBBBB. Therefore, emissions of benzene are deemed to be in compliance with the TAP program per IDAPA 58.01.01.210.20.

Naphthalene: Naphthalene is emitted from tank modifications, the product loading rack, the VCU, and leaks from new equipment components. The uncontrolled emission rate of naphthalene exceeds the screening EL for naphthalene when treated as a PAH, but the uncontrolled emission rate does not exceed the screening EL for naphthalene as a non-carcinogenic TAP. The compliance strategy taken for naphthalene is to demonstrate that the controlled ambient concentration of naphthalene impacts from the PTC project are less than the AAC established for naphthalene.

All Other TAP: As shown in the "Uncontrolled TAP Emissions" column, the uncontrolled emission rate of the pollutant is below the screening EL promulgated by IDEQ for the TAP species. The "Uncontrolled TAP Emissions" column is based on the sum of the preceding columns, except that in lieu of including VCU emissions, the product loading rack emissions are scaled upward by a factor of 125. This factor of 125 accounts for the fact that in current operation, emissions from the TAP are captured according to the capture efficiency below. Therefore, scaling the loading rack's current emissions by a factor greater than the factor calculated below is representative of the loading rack's completely uncontrolled emissions.

Capture Eff.	99.2%	
Uncaptured:	0.8%	= 100% - Capture Eff., %
Min. Scaling Fctr:	125	= 100% / Uncaptured, %

Table C-17b. Toxic Air Pollutant Threshold Comparisons (Cont'd)

Pollutant	CAS No.	Total TAP Emissions for PTC Permitting (lb/hr)	Uncontrolled TAP Emissions for PTC Permitting ^c (lb/hr)	Screening Emission Level ^c (lb/hr)	Uncontrolled Emissions Exceeding Screening Level? (Y/N)	Short-Term Emissions with VCU Exceeding Screening Level? (Y/N)	Acceptable Ambient Concentration ^c (µg/m ³)	
1,2,4-Trimethylbenzene	95-63-6	8.37E-03	3.36E-01	8.2	NO	NO	0.12 - See Footnote	
2,2,4-Trimethylpentane	540-84-1	1.51E-01	7.21E+00	23.3	NO	NO		
Benzene	71-43-2	1.88E-01	9.12E+00	8.00E-04	YES	YES		
Biphenyl	92-52-4	1.13E-06	1.97E-05	0.1	NO	NO		
Cresols	1319-77-3	3.81E-05	6.62E-04	1.47	NO	NO		
Ethylbenzene	100-41-4	1.49E-02	6.79E-01	29	NO	NO		
Hexane (-n)	110-54-3	3.60E-01	1.54E+01	12	YES	NO		
Isopropyl benzene (cumene)	98-82-8	1.54E-03	5.77E-02	16.3	NO	NO		
Methanol	67-56-1	2.68E-02	1.30E+00	17.3	NO	NO		
Naphthalene	91-20-3	4.41E-04	1.20E-02	9.1E-05	YES	YES		0.014
Naphthalene	91-20-3	4.41E-04	1.20E-02	3.33	NO	NO		
Phenol	108-95-2	4.14E-04	7.19E-03	1.27	NO	NO		7.70E-02
Styrene	100-42-5	7.54E-04	3.65E-02	6.67	NO	NO		
Toluene	108-88-3	2.31E-01	1.10E+01	25	NO	NO		
Xylenes	1330-20-7	9.21E-02	4.24E+00	29	NO	NO		
Dichlorobenzene	25321-22-6	2.20E-05	--	20	--	NO		
Formaldehyde	50-00-0	1.38E-03	--	5.10E-04	--	YES		
Nitrous Oxide	10024-97-2	5.62E-03	--	6	--	NO		
Arsenic	7440-38-2	3.67E-06	--	1.5E-06	--	YES		
Beryllium	7440-41-7	2.20E-07	--	2.8E-05	--	NO		
Cadmium	7440-43-9	2.02E-05	--	3.7E-06	--	YES		
Chromium	7440-47-3	2.57E-05	--	0.033	--	NO		
Cobalt	7440-48-4	1.54E-06	--	0.0033	--	NO		
Manganese	7439-96-5	6.98E-06	--	0.067	--	NO		
Mercury	7439-97-6	4.78E-06	--	--	--	--		
Nickel	7440-02-0	3.86E-05	--	2.7E-05	--	YES	4.20E-03	
Selenium	7782-49-2	4.41E-07	--	0.013	--	NO		
7-PAH		2.09E-07	--	2.0E-06	--	NO	4.20E-03	
Benz(a)anthracene	56-55-3	3.31E-08	--	--	--	--		
Benzo(a)pyrene	50-32-8	2.20E-08	--	2.00E-06	--	NO		
Benzo(b)fluoranthene	205-99-2	3.31E-08	--	--	--	--		
Benzo(k)fluoranthene	205-82-3	3.31E-08	--	--	--	--		
Dibenzo(a,h)anthracene	53-70-3	2.20E-08	--	--	--	--		
Chrysene	218-01-9	3.31E-08	--	--	--	--		
Indeno(1,2,3-cd)pyrene	193-39-5	3.31E-08	--	--	--	--		
Other PAH		1.41E-06	--	9.1E-05	--	NO		
2-Methylnaphthalene	91-57-6	4.41E-07	--	--	--	--		
7,12-Dimethylbenz(a)anthracene	57-97-6	2.94E-07	--	--	--	--		
Benzo(g,h,i)perylene	191-24-2	2.20E-08	--	--	--	--		
3-Methylcholanthrene	56-49-5	3.31E-08	--	2.50E-06	--	NO		
Acenaphthene	83-32-9	3.31E-08	--	--	--	--		
Acenaphthylene	203-96-8	3.31E-08	--	--	--	--		
Anthracene	120-12-7	4.41E-08	--	--	--	--		
Fluoranthene	206-44-0	5.51E-08	--	--	--	--		
Fluorene	86-73-7	5.14E-08	--	--	--	--		
Phenanthrene	85-01-8	3.12E-07	--	--	--	--		
Pyrene	129-00-0	9.18E-08	--	--	--	--		

^a Product loading rack short-term emissions are calculated in Table C-16b.

^b Short-term emissions from the VCU stack are computed in Tables C-15 and C-16a. The sum for each pollutant of emission rates in Tables C-15 and C-16a is presented here.

^c Screening emission levels and Allowable Ambient Concentrations (AACs) are given in Sections 585 and 586 of IDAPA 58.01.01. The EL for naphthalene is set to the PAH EL and annual averaging period, based on correspondence with Cheryl Robinson, July 2, 2014. The compliance strategy taken for each TAP is as follows:

Benzene: Gasoline is the only petroleum product containing benzene emissions (diesel and jet products do not contain appreciable amounts of benzene). Benzene emissions from gasoline storage tanks, gasoline loading, and leaks from equipment in gasoline service are regulated under NESHAP Subpart BBBBBB. Therefore, emissions of benzene are deemed to be in compliance with the TAP program per IDAPA 58.01.01.210.20.

Naphthalene: Naphthalene is emitted from tank modifications, the product loading rack, the VCU, and leaks from new equipment components. The uncontrolled emission rate of naphthalene exceeds the screening EL for naphthalene when treated as a PAH, but the uncontrolled emission rate does not exceed the screening EL for naphthalene as a non-carcinogenic TAP. The compliance strategy taken for naphthalene is to demonstrate that the controlled ambient concentration of naphthalene impacts from the PTC project are less than the AAC established for naphthalene.

All Other TAP: As shown in the "Uncontrolled TAP Emissions" column, the uncontrolled emission rate of the pollutant is below the screening EL promulgated by IDEQ for the TAP species. The "Uncontrolled TAP Emissions" column is based on the sum of the preceding columns, except that in lieu of including VCU emissions, the product loading rack emissions are scaled upward by a factor of 125. This factor of 125 accounts for the fact that in current operation, emissions from the TAP are captured according to the capture efficiency below. Therefore, scaling the loading rack's current emissions by a factor greater than the factor calculated below is representative of the loading rack's completely uncontrolled emissions.

Capture Eff.	99.2%	
Uncaptured:	0.8%	= 100% - Capture Eff. %
Min. Scaling Fctr:	125	= 100% / Uncaptured, %

Table C-17c. Criteria Pollutant Modeling Threshold Comparisons

Pollutant	Annual VCU Emissions ^a (tpy)	Level I Threshold ^a (tpy)	Meets Threshold?	Annual NG Combustion Emissions ^a (tpy)	Total Criteria Pollutant Emissions (tpy)
NO _x	3.23	1.20	Exceeding	0.05	3.28
CO	1.81	--	--	0.04	1.85
Pollutant	Annual VCU Emissions ^a (tpy)	BRC Threshold ^c (tpy)	Meets Threshold?		
PM ₁₀	0.17	2.50	BRC		
PM _{2.5}	0.17	1.50	BRC		
SO ₂	0.02	4.00	BRC		
Pollutant	Short-Term VCU Emissions ^b (lb/hr)	Level I Threshold ^a (lb/hr)	Meets Threshold?	Short-Term NG Combustion Emissions ^b (lb/hr)	Total Criteria Pollutant Emissions (lb/hr)
NO _x	8.99	0.20	Exceeding	0.01	9.00
CO	5.03	15.00	Meets Level I	0.01	5.04

^a Total annual potential emissions from the VCU are provided in Tables C-7 and C-13. Loading rack emissions VOC are calculated using the emission factor shown in Table C-7a, while emissions of CO, NO_x, PM, and SO₂ are estimated in Table C-7b. Criteria pollutant emissions from natural gas combustion at the comfort heater are calculated in Table C-13. (Emissions from the comfort heater are calculated at PTE for both hourly and annual emissions, so hourly emission rates convert exactly to annual emission rates.) Annual Level I thresholds from IDEQ modeling guidance are used to determine whether each pollutant requires a modeling demonstration.

^b Total short-term potential emissions of criteria pollutants are calculated in Tables C-13 and C-14d. The basis for short-term emissions is the maximum short-term throughput of the loading rack, rather than the maximum annual throughput proposed in the PTC application.

^c Pollutants that are Below Regulatory Concern (BRC) are within the Category I PTC exemption for IDEQ review, and these pollutants are not treated as subject to PTC review or PTC modeling review. Per IDAPA 58.01.01.221.01, a source is BRC if "the maximum capacity of a source to emit an air pollutant under its physical and operational design considering limitations on emissions such as air pollution control equipment, restrictions on hours of operation and restrictions on the type and amount of material combusted, stored or processed shall be less than ten percent (10%) of the significant emission rates set out in the definition of significant at Section 006."

Table C-17d. Criteria Pollutant Modeling Emission Rates for NO_x

Emission Source	Heat Rate (Btu/hr)	Annual Emissions ^a		Short-Term Emissions ^b	
		(tpy)	(g/s)	(lb/hr)	(g/s)
VCU	--	3.23	9.299E-02	8.99	1.133E+00
Heater #1	105,000	0.05	1.297E-03	0.01	1.297E-03
Total		3.28	9.428E-02	9.00	1.134E+00

^a Emissions provided in Table C-17c above (total criteria pollutant emissions). Conversions to g/s assume 8,760 operating hours/yr.

^b Emissions provided in Table C-17c above.

Table C-17e. TAP Modeling Emission Rates for Heaters

Emission Source	Heat Rate (Btu/hr)	Benzene Annual Emissions ^a		Naphthalene Annual Emissions ^a	
		(tpy)	(g/s)	(tpy)	(g/s)
VCU	--	8.79E-04	2.530E-05	6.52E-05	1.875E-06
Heater #1	105,000	9.47E-07	2.724E-08	2.75E-07	7.912E-09
Total		8.80E-04	2.53E-05	6.55E-05	1.88E-06
Emission Source		Formaldehyde Annual Emissions ^a		Arsenic Annual Emissions ^a	
		(tpy)	(g/s)	(tpy)	(g/s)
VCU		4.93E-04	1.417E-05	1.31E-06	3.778E-08
Heater #1		3.38E-05	9.728E-07	9.02E-08	2.594E-09
Total		5.26E-04	1.51E-05	1.40E-06	4.04E-08
Emission Source		Cadmium Annual Emissions ^a		Nickel Annual Emissions ^a	
		(tpy)	(g/s)	(tpy)	(g/s)
VCU		7.22E-06	2.078E-07	1.38E-05	3.967E-07
Heater #1		4.96E-07	1.427E-08	9.47E-07	2.724E-08
Total		7.72E-06	2.22E-07	1.47E-05	4.24E-07

^a Emissions provided in Table C-13. Conversions to g/s assume 8,760 operating hours/yr. Emissions include both the VCU and the small contributions from other sources.

Tesoro Logistics Operations , LLC - Pocatello - Modeling requirements for conversion of Tier II operating permit to PTC



<Cheryl.Robinson@deq.idaho.gov>

08/08/2013 12:39 PM

To: <Brooks.D.Neighbors@tsocorp.com>
<Ahenolson@trinityconsultants.com>,
Cc: <HLaurence@TrinityConsultants.com>,
<MHillman@trinityconsultants.com>,
Bcc:
Client: Tesoro 130502.0029

Category: General

Dear Mr. Neighbors,

My understanding is that the Tier II operating permit for Tesoro's Pocatello terminal will expire on September 9, 2013, and discussions have been underway with Bill Rogers, permit coordinator for DEQ's Stationary Source Permitting Program, regarding whether to renew the Tier II permit or convert the Tier II permit to a Permit to Construct (PTC). Facility-wide modeling for criteria pollutant emissions (PM10, PM2.5, CO, NO2, SO2, and lead) will be required to renew the Tier II operating permit. No modeling demonstration will be required, however, if the Tier II permit is converted to a PTC at this time.

Please include a copy of this email with your permit application. If you have any questions, please don't hesitate to contact me.

Best regards,
Cheryl

Cheryl A. Robinson, P.E.
NSR Air Quality Modeling Analyst
Idaho Department of Environmental Quality
1410 N. Hilton
Boise, Idaho 83706
Tel: (208) 373-0220 Main: (208) 373-0502
cheryl.robinson@deq.idaho.gov
www.deq.idaho.gov

From: Anna Henolson [<mailto:Ahenolson@trinityconsultants.com>]
Sent: Thursday, August 08, 2013 12:02 PM
To: Cheryl Robinson
Cc: Neighbors, Brooks; Harold Laurence; Melissa Hillman
Subject: Modeling requirements for conversion of Tier II operating permit to PTC

Hello Cheryl,

I received your voice message. Thank you for your quick response.

It appears Tesoro will be able to convert the Tier II permit to a PTC. Sending me a quick email confirming no modeling is needed for this PTC conversion process (and that it would be needed for a Tier I renewal), as you mentioned in your voice message, would be very helpful.

Thank you,
Anna

Anna Henolson, P.E. | Senior Consultant

[Trinity Consultants](#) | 20819 72nd Avenue S., Suite 610 | [Kent, WA](#) 98032

P: 253.867.5600 | F: 253.867.5601 | E: ahenolson@trinityconsultants.com

The information transmitted is intended only for the person or entity to which it is addressed and may contain confidential and/or privileged material. Any review, retransmission, dissemination or other use of, or taking of any action in reliance upon, this information by persons or entities other than the intended recipient is prohibited. If you Received this in error, please contact the sender and delete the material from any computer.

Harold Laurence

From: Cheryl.Robinson@deq.idaho.gov
Sent: Thursday, August 28, 2014 9:22 PM
To: Harold Laurence
Cc: Harbi.Elshafei@deq.idaho.gov; Kevin.Schilling@deq.idaho.gov; Darrin.Mehr@deq.idaho.gov
Subject: Tesoro Pocatello - Met Data and Prelim Background Values
Attachments: Met Data and Prelim Background Values for TESORO POCATELLO 8-28-14.docx; Pocatello_KPIH_2008-2012t.ZIP

Welcome back, Harold,

Met data from the Pocatello airport (KPIH) is the best representative readily-available data set. The attached zip file contains the AERMOD-ready met files, wind rose, wind class frequency profile, and a processing report. I also pulled the NW Airquest background concentrations for the Tesoro Pocatello location, which is just east of the airport at 1189 Tank Road (thanks for giving me the address). See the attached Word file.

Hope you had a great vacation!

Best regards,
Cheryl



Cheryl A. Robinson, P.E.

NSR Air Quality Modeling Analyst
Idaho Department of Environmental Quality
1410 N. Hilton, Boise, Idaho 83706
Tel: (208) 373-0220 Main: (208) 373-0502
cheryl.robinson@deq.idaho.gov
www.deq.idaho.gov
Normal schedule: 11 am to 8 pm, Mon - Fri

Harold Laurence

From: Harbi.Elshafei@deq.idaho.gov
Sent: Monday, August 04, 2014 8:59 AM
To: Harold Laurence
Cc: Peter.M.Hendricks@tsocorp.com; William.Rogers@deq.idaho.gov

Good morning Harold:

I discussed with Bill Rogers the vapor combustion unit (VCU) existing at Tesoro Logistic Operations, Pocatello Terminal (TLO). As I also discussed with you before that the VCU was constructed in 1997 without prior obtaining a PTC, so it will be treated as a new source and as such the regulated air pollutant emissions from the source will need to be evaluated for modeling purposes.

DEQ would recommend that TLO withdraw the current PTC application for TLO, Pocatello Terminal and submit a new application, which include evaluation of emissions from the VCU.

DEQ will consider the previous PTC application fees is applicable to the forthcoming PTC application.

The withdrawn application letter must be signed by the company's responsible official.

If you have any questions, please let me know.

Sincerely,

Harbi Elshafei
Air Quality Permitting Analyst 3
Air Quality Division
Idaho DEQ
(208) 373-0501
Fax: (208) 373-0340

Harold Laurence

From: Darrin.Mehr@deq.idaho.gov
Sent: Friday, March 18, 2016 7:56 AM
To: Harold Laurence
Cc: Kirt.W.Rhoads@tsocorp.com; Kevin.Schilling@deq.idaho.gov; William.Rogers@deq.idaho.gov
Subject: RE: TRIM: Tesoro Pocatello Model Protocol Review Request
Attachments: Protocol approval_Tesoro Pocatello 2_26_16 prot.pdf

Good morning Harold,

Please find the DEQ modeling protocol approval letter attached. The comments are minimal. Thank you for submitting a very well prepared modeling protocol complete with detailed explanation and documentation for me to consider in drafting the conditional protocol approval.

I look forward to working with you on completing the modeling portion of the project when it is submitted.

Best regards,
Darrin

Darrin Mehr
Air Quality Analyst
Stationary Source Modeling
Monitoring, Modeling, and Emissions Inventory, Air Program
State of Idaho Department of Environmental Quality
Phone: 208-373-0536 (direct)
Email: Darrin.Mehr@deq.idaho.gov

From: Harold Laurence [mailto:hlaurence@trinityconsultants.com]
Sent: Friday, February 26, 2016 4:57 PM
To: Kevin Schilling
Cc: Darrin Mehr; Rhoads, Kirt W
Subject: TRIM: Tesoro Pocatello Model Protocol Review Request

Good afternoon Kevin,

Please find enclosed a protocol for an air dispersion model analysis for the petroleum products terminal located at 1189 Tank Farm Rd., Pocatello, ID (the Pocatello terminal), which is operated by Tesoro Logistics Operations LLC (TLO). TLO seeks a protocol approval and comment from the Idaho Department of Environmental Quality (IDEQ).

This protocol is submitted in support of a forthcoming Permit to Construct (PTC) application package which will include synthetic minor limits for the terminal. The PTC application will treat the Vapor Combustion Unit (VCU) as if it were a new source for the purposes of PTC applicability, modeling applicability, and modeling analysis.

This protocol corresponds to a future modeling analysis for nitrogen dioxide (NO₂), benzene, and naphthalene emissions, to be submitted with the forthcoming PTC application package.

TLO appreciates your prompt attention to this model protocol, and awaits IDEQ’s determination regarding approval and comments. Please feel free to reach out with any questions.

Attachments

Please note that this model protocol contains five attachments:

1. Calculation tables representing the Potential to Emit (PTE) of the Pocatello terminal, and the model input parameters;
2. A plot plan of the Pocatello terminal;
3. A 2001 performance test for the Pocatello terminal’s VCU;
4. A 2014 report prepared by Cheryl Robinson, then of IDEQ, describing the meteorological data used in the modeling analysis;
5. A series of seven plots of model outcomes on aerial imagery. As noted above in “Preliminary Results,” these model outcomes are subject to change in the final model, but they provide a reasonable anticipatory metric of the areas where the final modeling analysis will have an impact. These will be sent in accompanying e-mails because of their larger file size.

Gasoline Emissions

Please note that in Section 3.3, “TAP Modeling Applicability,” the modeling applicability of Toxic Air Pollutants (TAP) is treated in some detail. The section argues that benzene and naphthalene emissions attributable to gasoline loading are exempt from modeling under IDAPA 58.01.01.210.20, on the basis that these emissions are Hazardous Air Pollutants (HAP) subject to regulation under National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart R.

Preliminary Results

Please note that this protocol contains a set of preliminary results in Section 6 and Attachment 5 (results plots). These results are provided for informational purposes only. They reflect the model outcomes which TLO expects to achieve given the parameters stated in the protocol, current available modeling software, meteorological data, terrain data, and all other model components represented in this correspondence. The preliminary results remain subject to change in the final modeling analysis. For example, they are not reflective of any changes which may be made to the modeling approach based on IDEQ comments during the protocol approval process. The purpose of providing the preliminary results is to provide a metric for IDEQ to discern the amount of margin expected between model outcomes and state and federal modeling thresholds (National Ambient Air Quality Standards [NAAQS]; Acceptable Ambient Concentrations [AACs] for TAP). Specifically, the preliminary results show substantial amounts of margin between each result and its corresponding threshold.

Best Regards,

HAROLD A. LAURENCE V | Consultant

Trinity Consultants | 20819 72nd Avenue S., Suite 610 | Kent, WA 98032
P: 253.867.5600 | F: 253.867.5601 | E: hlaurence@trinityconsultants.com

Upcoming Events:

[April 5, 2016 – Air Quality Permitting in Oregon \(PORTLAND\)](#)

[April 12, 2016 – NSR / PSD Compliance Workshop \(SEATTLE, WA\)](#)

[April 14, 2016 – Title V Compliance Workshop \(SEATTLE, WA\)](#)

[April 28, 2016 – Air Quality Permitting in Montana \(BILLINGS\)](#)

Visit us online:



The information transmitted is intended only for the person or entity to which it is addressed and may contain confidential and/or privileged material. Any review, retransmission, dissemination or other use of, or taking of any action in reliance upon, this information by persons or entities other than the intended recipient is prohibited. If you received this in error, please contact the sender and delete the material from any computer.



STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

1410 NORTH HILTON, BOISE, ID 83706 • (208) 373-0502

C. L. "BUTCH" OTTER, GOVERNOR
JOHN H. TIPPETS, DIRECTOR

March 18, 2016

VIA EMAIL

Harold A. Laurence V
Consultant
Trinity Consultants
20819 72nd Ave. S., Suite 160
Kent, WA 98032

RE: Modeling Protocol Conditional Approval for a Facility-Wide Permit to Construct (PTC)
for the Existing Tesoro Logistics Facility Near Pocatello, Idaho

Dear Mr. Laurence,

DEQ received a dispersion modeling protocol from Trinity Consultants (Trinity) via email on February 26, 2016. The modeling protocol was submitted on behalf of Tesoro Logistics, LLP (Tesoro). The modeling protocol proposes methods and data for use in Class II area ambient air impact analyses in support of a permitting analysis to approve past changes the facility which included the installation of a vapor control unit (VCU) to control captured loading rack emissions of volatile organic compounds.

The modeling protocol has been reviewed and DEQ has the following comments:

- Comment 1: Emission Rates and Project Modeling Applicability.** The protocol included a detailed emissions inventory and a discussion of the approach for which sources to include in the analyses. A cursory review of the approach and values appears reasonable to modeling staff; however, DEQ's assigned permit writer is tasked with the responsibility of emissions inventory review and approval of the scope of the project. The permit writer will also finalize approval of the exemption of certain toxic air pollutant emissions based on applicability of the Pocatello facility's operation to federal standards including New Source Performance Standards (NSPS), National Emission Standards for Hazardous Air Pollutants (NESHAPs), or Maximum Achievable Control Technology (MACT) standards.
- **Comment 2: Justification of Release Parameters.** Documentation and justification of release parameters was included in the modeling protocol. A partial copy of the November 9, 2001, performance test on the VCU was included in the protocol. The submitted pages do not contain supporting documentation for the VCU stack release height or inside diameter. The protocol indicated that the height and diameter of the VCU stack and the comfort heater were determined by on-site measurement. If a copy of the on-site measurements exists please submit this as support documentation. Alternatively,

manufacturer's design specification sheets or schematic diagrams for the models installed at the facility provide adequate support documentation.

- **Comment 3: Receptor Grid.** The proposed receptor grid appears to provide good impact resolution for the modeling analyses. Placement of additional densely-spaced receptor grids to resolve maximum concentrations is contingent upon whether a significant concentration gradient exists between adjoining receptors and how close the permit application's modeling demonstration is to allowable NAAQS or TAPs increments.

If review of the submitted modeling results does not clearly show that maximum modeled impacts are resolved to the point that compliance is assured, the applicant will be asked to rerun the analyses using a tighter receptor grid. Alternatively, if DEQ performs a sensitivity analysis using a more densely-spaced receptor grid and any applicable ambient standard is exceeded, the permit application will be declared incomplete or may be denied. Approval of an initial receptor grid described in a modeling protocol does not qualify for final approval of a receptor grid layout for this project. Please note that if the project's final impacts are close to those presented in the modeling protocol further refinement of the receptor grid is not likely to be an issue.

- **Comment 4: Building Downwash.** Please include all structures within a distance of "5L" of any emission source which may be affected by building downwash in the model setup.

DEQ's modeling staff considers the submitted dispersion modeling protocol, with resolution of the additional items noted above, to be approved. It should be noted, however, that the approval of the modeling protocol is not meant to imply approval of completed dispersion modeling analyses. The protocol approval does not provide an exhaustive review of all issues that may factor into the completeness of the modeling demonstration, and more extensive documentation in the permit application's modeling report may be necessary where the modeling protocol does not provide supporting documentation and detail. Completeness determinations weigh the materials presented in permit application and modeling report in evaluating whether the modeling analyses adequately demonstrate compliance with the applicable standards and increments. Please refer to the State of Idaho Air Quality Modeling Guideline, which is available on the Internet at <http://www.deq.idaho.gov/media/1029/modeling-guideline.pdf>, for further guidance.

To ensure a complete and timely review of any analyses submitted to the Idaho Department of Environmental Quality, our modeling staff requests that electronic copies of all modeling input and output files (including BPIP and AERMAP) be submitted with analyses reports. Also, please include a copy of the protocol and this approval notice with the submitted application. If you have any further questions or comments, please contact me at (208) 373-0536.

Sincerely,

Darrin Mehr

Darrin Mehr
Air Quality Analyst
Monitoring, Modeling, and Emission Inventories
Air Quality Stationary Source Program

This modeling analysis treats the VCU as a “new” source, and demonstrates that the VCU may receive a PTC according to IDEQ regulations.

2.1 General Facility/Project Description

The Pocatello terminal is located at 1189 Tank Farm Rd., Pocatello, ID 83204. The terminal is home to 23 petroleum product storage tanks (numbers 901 through 922, and 930), of which four (904, 912, 913, and 930) are out of service. The terminal also contains several smaller tanks (a 21,000 gal tank and several <10,000 gal each) for petroleum product additives.

The terminal receives gasoline and diesel products by pipeline.

The terminal operates a single loading rack for tank trucks. The terminal ships the refined products by tank truck at three loading bays for gasoline and diesel. Pipeline interface is stored in a transmix tank (Tank 902), to be loaded out through a dedicated transmix bay at the loading rack.

Emissions from tank truck loading at all four bays are routed to the VCU by a vapor collection system. The VCU combusts all vapors generated at the loading rack, producing combustion pollutants—primarily NO_x and CO, with negligible amounts of PM and SO₂. The VCU contains a pilot flame which is fueled with natural gas.

The terminal receives and stores denatured ethanol by tank truck for the purpose of blending with gasoline.

Aside from the VCU, the terminal operates one other combustion source, a small comfort heater. These are the only two sources of combustion emissions at the terminal.

Because this PTC will be the first PTC to include the terminal’s Vapor Combustion Unit (VCU), the emission rates from the VCU are evaluated at full PTE. However, there are no ‘modifications’ represented in this modeling analysis.

2.2 Location of Project

The Pocatello terminal is located at 1189 Tank Farm Rd., Pocatello, ID 83204. The facility center is in UTM Zone 12 at coordinates 374,809.5 m East; 4,752,788 m North (NAD83 Projection).

The terrain in the area is relatively flat. Within the square area covered by receptors in this modeling analysis (16 km by 16 km for the NO₂ models, and NO₂ is the only pollutant emitted from point sources), the maximum elevation is 1,776.53 m and the minimum elevation is 1,328.07 m.¹

¹ As will be described in more detail later, the pollutants modeled in this analysis are benzene, naphthalene, and NO₂, of which NO₂ has a much longer-range receptor grid. NO₂ is the only one of these pollutants emitted from

Howard Mountain is located about 6 km to the south of the terminal, and it has a maximum elevation of 1,786 m. Further south are Kinport Peak and Rock Knoll, which are outside the range of receptors in this near-field modeling analysis. To the east of the terminal is the urban area of Pocatello, which is relatively flat. Beyond Pocatello (and outside the receptor grid) are Camelback Mountain and other peaks at the north end of the Wasatch Range.

From the northwest to the southwest lies the American Falls reservoir.

The land use within the receptor grid is primarily agricultural, with some urban areas and some uncultivated land.

An image showing the terminal location and the extent of receptors modeled in this analysis is provided in Figure 1.

_____A map showing the geographical location of the facility is provided in this section or a reference is provided to another location in the application where a map is provided.

point sources, which have the potential for transport of pollutants over a wider range. Other pollutants are emitted only from volume sources, so fence-line impacts are strongly expected to be greatest, and their associated receptor grids are denser and closer to the terminal fence-line.

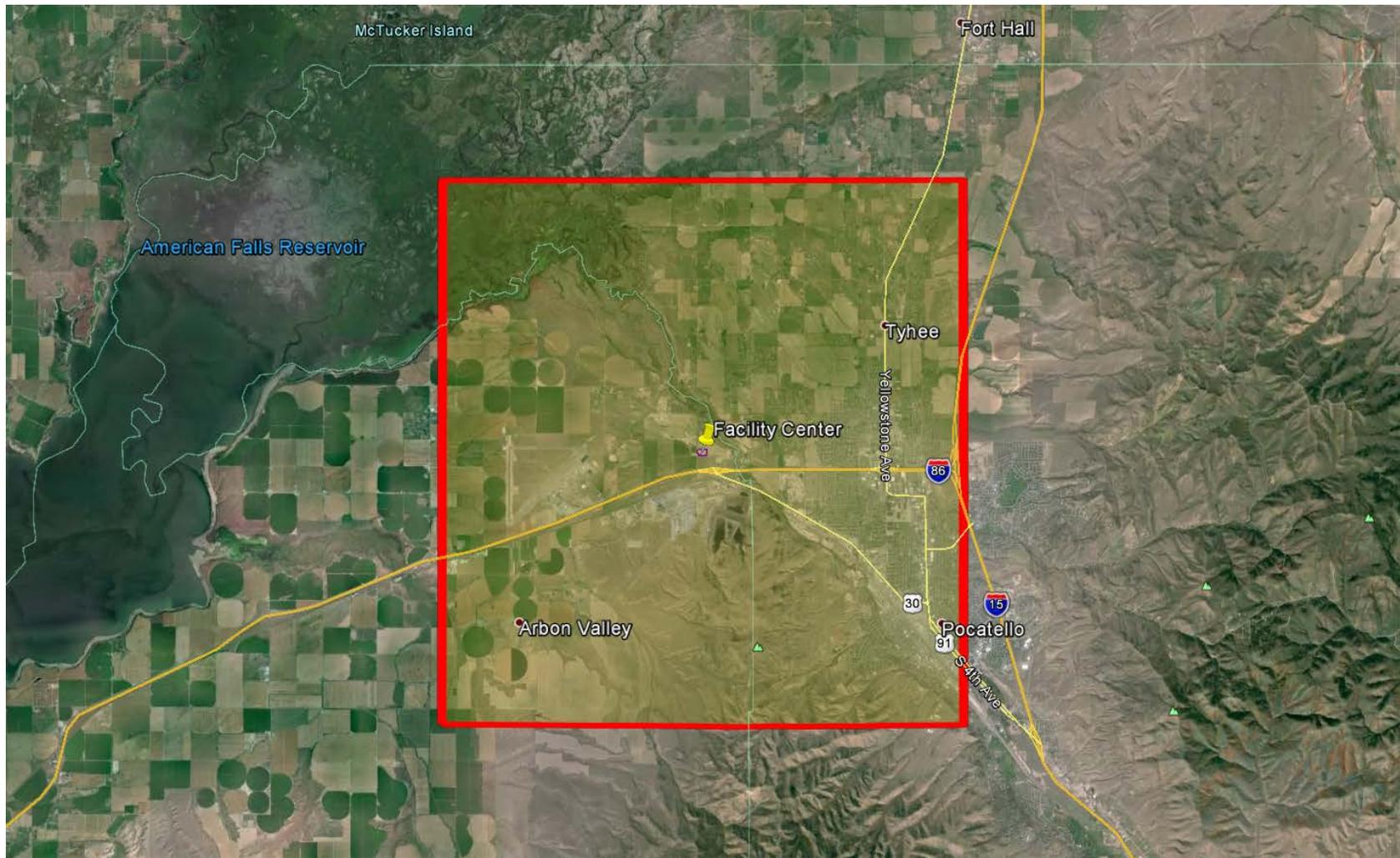


Figure 1. Receptor Grid Extent for Pocatello Terminal Modeling Analysis

2.3 Existing Permits and Modeling Analyses Performed

The terminal currently operates under Tier II operating permit number T2-2008.0026. This Tier II permit is not associated with any modeling analysis. The current modeling analysis does not depend on any prior analysis for its parameters.

____Any existing air quality permits are listed and described in this section, and any associated air quality modeling analyses have been described and referenced, and submitted if appropriate.

3.0 Modeling Analyses Applicability and Protocol

The current PTC application requires a modeling analysis that treats the terminal's VCU as a new source. Emissions from the VCU and the loading rack to which it is connected are the only emissions represented in this modeling analysis.

The loading rack emits fugitive emissions of volatile organic compounds (VOC) including speciated compounds classified as Toxic Air Pollutants (TAP). The VCU also emits VOC, TAP, and combustion pollutants: NO_x, CO, PM (negligible), and SO₂ (negligible).

As described in the following sections, emissions of NO₂, benzene, and naphthalene are subject to modeling requirements.

3.1 Applicable Standards

Criteria pollutant National Ambient Air Quality Standards (NAAQS) are listed in Table 1, along with significant impact levels (SILs).

Table 1. APPLICABLE REGULATORY LIMITS				
Pollutant	Averaging Period	Significant Impact Levels^a (µg/m³)^b	Regulatory Limit^c (µg/m³)	Modeled Design Value Used^d
PM ₁₀ ^e	24-hour	5.0	150 ^f	Maximum 6 th highest ^g
PM _{2.5} ^h	24-hour	1.2	35 ⁱ	Mean of maximum 8 th highest ^j
	Annual	0.3	12 ^k	Mean of maximum 1 st highest ^l
Carbon monoxide (CO)	1-hour	2,000	40,000 ^m	Maximum 2 nd highest ⁿ
	8-hour	500	10,000 ^m	Maximum 2 nd highest ⁿ
Sulfur Dioxide (SO ₂)	1-hour	3 ppb ^o (7.8 µg/m ³)	75 ppb ^p (196 µg/m ³)	Mean of maximum 4 th highest ^q
	3-hour	25	1,300 ^m	Maximum 2 nd highest ⁿ
	24-hour	5	365 ^m	Maximum 2 nd highest ⁿ
	Annual	1.0	80 ^r	Maximum 1 st highest ⁿ
Nitrogen Dioxide (NO ₂)	1-hour	4 ppb (7.5 µg/m ³)	100 ppb ^s (188 µg/m ³)	Mean of maximum 8 th highest ^t
	Annual	1.0	100 ^r	Maximum 1 st highest ⁿ
Lead (Pb)	3-month ^u	NA	0.15 ^r	Maximum 1 st highest ⁿ
	Quarterly	NA	1.5 ^r	Maximum 1 st highest ⁿ
Ozone (O ₃)	8-hour	40 TPY VOC ^v	75 ppb ^w	Not typically modeled

- a. Idaho Air Rules Section 006 (definition for significant contribution) or as incorporated by reference as per Idaho Air Rules Section 107.03.b.
- b. Micrograms/cubic meter.
- c. Incorporated into Idaho Air Rules by reference, as per Idaho Air Rules Section 107.
- d. The maximum 1st highest modeled value is always used for the significant impact analysis unless indicated otherwise. Modeled design values are calculated for each ambient air receptor.
- e. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.
- f. Not to be exceeded more than once per year on average over 3 years.
- g. Concentration at any modeled receptor when using five years of meteorological data.
- h. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.
- i. 3-year mean of the upper 98th percentile of the annual distribution of 24-hour concentrations.
- j. 5-year mean of the 8th highest modeled 24-hour concentrations at the modeled receptor for each year of meteorological data modeled. For the SIL analysis, the 5-year mean of the 1st highest modeled 24-hour impacts at the modeled receptor for each year.
- k. 3-year mean of annual concentration.
- l. 5-year mean of annual averages at the modeled receptor.
- m. Not to be exceeded more than once per year.
- n. Concentration at any modeled receptor.
- o. Interim SIL established by EPA policy memorandum.
- p. 3-year mean of the upper 99th percentile of the annual distribution of maximum daily 1-hour concentrations.
- q. 5-year mean of the 4th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of 1st highest modeled 1-hour impacts for each year is used.
- r. Not to be exceeded in any calendar year.
- s. 3-year mean of the upper 98th percentile of the annual distribution of maximum daily 1-hour concentrations.
- t. 5-year mean of the 8th highest daily 1-hour maximum modeled concentrations for each year of meteorological data modeled. For the significant impact analysis, the 5-year mean of maximum modeled 1-hour impacts for each year is used.
- u. 3-month rolling average.
- v. An annual emissions rate of 40 ton/year of VOCs is considered significant for O₃.
- w. Annual 4th highest daily maximum 8-hour concentration averaged over three years.

Certain TAP species emitted from the loading rack and VCU are identified in Table 2. While many TAP species are emitted in small quantities, the vast majority are calculated to be below their screening emission levels (ELs). For a full list of screening ELs and Acceptable Ambient Concentrations (AACs), compared with the loading rack and VCU emissions, please refer to the attached emission calculation tables.

Table 2. TAP ELS AND AACs/AACCS			
TAP	Non-Carcinogen or Carcinogen	Screening Emissions Level (EL)^a (lb/hr)	AAC or AACCS^b (µg/m³)
Benzene	Carcinogen	0.0008	0.12
Naphthalene (As PAC)	Carcinogen	0.000091	0.014
Naphthalene (As non-carcinogenic TAP)	Non-Carcinogen	3.33	2.5
Others	Various	Various	Various

a. ELs from Idaho Air Rules Section 585 and 586 in pounds/hour .

b. Acceptable Ambient Concentration (AAC) or Acceptable Ambient Concentration for a Carcinogen (AACCS) from Idaho Air Rules Section 585 and 586, in micrograms/cubic meter or milligrams/cubic meter. Note that AACs listed in Idaho Air Rules Section 585 are expressed in units of milligrams/cubic meter rather than micrograms/cubic meter.

_____All TAPs identified in the emissions inventory for the project are listed in the TAPs EL and AAC/AACC Table in this section.

3.2 Criteria Pollutant Modeling Applicability

Table 3 lists criteria pollutants for which site-specific modeling analyses were performed to demonstrate compliance with the NAAQS.

Table 3. MODELING APPLICABILITY		
Criteria Pollutant	Modeled (yes/no)	Basis for Exclusion from Modeling
PM _{2.5} 24-hour	No	___ BRC Exempt ^a _X_ Emissions Below Level I Thresholds ^b ___ Emissions Below Level II Thresholds ^c
PM _{2.5} annual	No	___ BRC Exempt _X_ Emissions Below Level I Thresholds ___ Emissions Below Level II Thresholds
PM ₁₀ 24-hour	No	___ BRC Exempt _X_ Emissions Below Level I Thresholds ___ Emissions Below Level II Thresholds
NO ₂ 1-hour	Yes	___ BRC Exempt ___ Emissions Below Level I Thresholds ___ Emissions Below Level II Thresholds
NO ₂ annual	Yes	___ BRC Exempt ___ Emissions Below Level I Thresholds ___ Emissions Below Level II Thresholds
SO ₂ 1-hour, 3-hour	No	___ BRC Exempt _X_ Emissions Below Level I Thresholds ___ Emissions Below Level II Thresholds
SO ₂ annual	No	___ BRC Exempt _X_ Emissions Below Level I Thresholds ___ Emissions Below Level II Thresholds
CO 1-hour, 8-hour	No	___ BRC Exempt _X_ Emissions Below Level I Thresholds ___ Emissions Below Level II Thresholds
Pb annual	No	_X_ BRC Exempt ___ Emissions Below Level I Thresholds ___ Emissions Below Level II Thresholds

- ^{a.} If the project would have qualified for a Category I BRC permitting exemption for the criteria pollutant in question, as per Idaho Air Rules Section 221.01, except for the emissions quantities of another criteria pollutant, then a NAAQS compliance analysis is not required under Section 203.02 or 403.02 for that criteria pollutant.
- ^{b.} Level I Modeling Thresholds from Table 2 in Section 3 of the DEQ Modeling Guideline. NAAQS compliance is assured through DEQ's non-site-specific modeling analyses.
- ^{c.} Level II Modeling Thresholds from Table 2 in Section 3 of the DEQ Modeling Guideline. NAAQS compliance is assured through DEQ's non-site-specific modeling analyses. Level II Modeling Thresholds can only be used with prior DEQ approval.

Table 4 below replicates the table of comparison of VCU emissions against the Level I thresholds. The level I thresholds are more stringent (i.e. lower) than IDEQ's Level II thresholds. For a full

calculation for each of the criteria pollutant emission rates from the VCU, please refer the attached emission calculation tables.

Table 4. Criteria Pollutant Modeling Threshold Comparisons

Pollutant	Annual VCU Emissions (tpy)	Level I Threshold (tpy)	Meets Threshold?	Annual NG Combustion Emissions (tpy)	Total Criteria Pollutant Emissions (tpy)
CO	--	--	--	0.01	0.01
NO _x	9.43	1.20	Exceeding	0.08	9.50
PM ₁₀	--	--	--	0.00	0.00
PM _{2.5}	0.03	0.35	Meets Level I	0.00	0.04
SO ₂	0.00	1.20	Meets Level I	0.00	0.00
Pollutant	Short-Term VCU Emissions (lb/hr)	Level I Threshold (lb/hr)	Meets Threshold?	Short-Term NG Combustion Emissions (lb/hr)	Total Criteria Pollutant Emissions (lb/hr)
CO	6.20	15.00	Meets Level I	0.00	6.20
NO _x	2.48	0.20	Exceeding	0.02	2.50
PM ₁₀	0.01	0.22	Meets Level I	0.00	0.01
PM _{2.5}	0.01	0.05	Meets Level I	0.00	0.01
SO ₂	0.00	0.21	Meets Level I	0.00	0.00

_____ Explanations/documentation why modeling was or was not performed for each criteria pollutant are provided in this section.

_____ Emissions calculations that clearly show how the modeling applicability determination was performed are provided in this section.

3.3 TAP Modeling Applicability

Please refer to the attached emission calculations tables to review a complete comparison of all TAP species emission rates to screening ELs.

TAP reviewed in this analysis originate in one of two ways: either as trace quantities in the hydrocarbons emitted as fugitives at the loading rack, or as combustion byproducts at the VCU or comfort heater.

Two TAP scenarios are reviewed. First, the uncontrolled emission rate is calculated using the assumption (for permitting purposes only) that the VCU is not installed. Second, the controlled

emission rate is calculated using the assumption (true to operation) that the VCU combusts all vapors.

For TAP species which are emitted only during combustion from the VCU, the controlled emission rate is truly the rate when the VCU is not operating (namely 0); therefore, both uncontrolled and controlled emission rates are compared with the screening ELs. The outcome of this analysis, however, remains the same regardless of whether the uncontrolled emission rate is taken to be with or without the VCU operational.

The screening ELs for benzene and naphthalene as polycyclic aromatic compound (PAC) are exceeded, while the screening ELs for all other pollutants (including naphthalene's non-carcinogenic screening EL) are not.

Compliance with the program is demonstrated on a pollutant-by-pollutant basis, for each emission unit subject to permitting. A pollutant is in compliance with the TAP program if any of the following conditions can be met:

1. The uncontrolled emission rate of the pollutant is below the screening EL promulgated by IDEQ at §§ 585-86 (§210.05).
2. The uncontrolled ambient concentration of the pollutant, determined by a modeling analysis, is below the Acceptable Ambient Concentration (AAC) promulgated by IDEQ at §§ 585-86 (§210.06).
3. The controlled emission rate of the pollutant is below the screening EL promulgated by IDEQ at §§ 585-86, and the uncontrolled ambient concentration of the pollutant, determined by a modeling analysis, is below the AAC promulgated by IDEQ at §§ 585-86 (§210.07).
4. The controlled ambient concentration of the pollutant, determined by a modeling analysis, is below the AAC promulgated by IDEQ at §§ 585-86 (§210.08). If this method is used, IDEQ will establish a permit condition with an emission rate for the pollutant no greater than the emission rate used in modeling.
5. The "toxic air pollutant from the source or modification is regulated by the Department at the time of permit issuance under 40 CFR Part 60, 40 CFR Part 61 or 40 CFR Part 63" (§210.20).

Because the uncontrolled emission rate of each TAP other than benzene and naphthalene (as PAC) is below the corresponding screening EL, each TAP other than benzene and naphthalene (as PAC) is in compliance with IDAPA §210 by path 1 above.

Furthermore, emissions of federal Hazardous Air Pollutants (HAP) from gasoline loading are currently regulated under National Emission Standards for Hazardous Air Pollutants (NESHAP) Subpart R. Benzene and naphthalene emissions from gasoline loading are so regulated, and will be so regulated at the time of permit issuance. A justification of this regulatory status will be provided in the permit application. Therefore, benzene and naphthalene emissions from gasoline loading are

in compliance with IDAPA §210 by path 5 above. Benzene is contained only in gasoline and transmix; therefore, only transmix sources of benzene are modeled, and gasoline-related emissions of benzene from the VCU are not modeled.

Remaining emissions of benzene (transmix loading fugitives, transmix loading vapor combustion, and natural gas combustion at the VCU and comfort heater) and of naphthalene (diesel and transmix loading fugitives, diesel and transmix loading vapor combustion, and natural gas combustion at the VCU and comfort heater) are modeled in this analysis.

_____Explanation/documentation on why modeling was or was not performed for emissions of each TAP identified in the emissions inventory of the application are provided in this section.

3.4 Modeling Protocol

This submittal constitutes the modeling protocol for this analysis. TLO and Trinity await IDEQ's approval and comments on this protocol.

_____If a protocol was submitted to DEQ prior to performing the modeling analyses, the protocol and DEQ's conditional protocol approval notice is included in Attachment ____ of this Modeling Report.

_____Concerns identified by DEQ in the protocol approval notice have been addressed in the analyses performed and in this Modeling Report.

4.0 Modeled Emissions Sources

The following emission sources are modeled in this analysis:

- Loading Rack (Product Bays): BAY1_1, BAY1_2, BAY1_3, BAY2_1, BAY2_2, BAY2_3, BAY3_1, BAY3_2, BAY3_3
- Loading Rack (Transmix Bay): BAYT_1, BAYT_2, BAYT_3
- Comfort Heater: FURN
- VCU: VCU

The operational schedule is assumed to be 100% for each unit, as the units are modeled using PTE emission rates.

The VCU emits NO₂, benzene, and naphthalene. The VCU emission rates for benzene and naphthalene aggregate product loading (less gasoline), transmix loading, and pilot gas combustion emissions. These pollutants are only modeled on an annual basis. The VCU emission rate for NO₂ aggregates all expected NO₂ emissions, from all loading and pilot gas combustion. The NO₂ emission rate is tied to the throughput of product at the loading rack. Therefore, short-term emissions of NO₂ (based on maximum rack throughput multiplied across a maximum 75% efficiency of time spent loading per hour) are greater than annual emissions (based on facility throughput limits).

The loading rack's product bay and transmix bay sources emit only benzene and naphthalene, not NO₂. Therefore, they are modeled only against annual averaging periods. In the attached emission calculation tables, emissions are calculated for diesel/transmix benzene and for gasoline/diesel/transmix naphthalene. The gasoline and diesel emissions are equally apportioned among nine volume sources, in three triads arranged as lines east to west, which represent the three product loading bays. The transmix emissions are equally apportioned among a fourth triad arranged to represent the transmix loading bay.

The comfort heater's emissions are calculated using AP-42 emission factors for NO₂, benzene, and naphthalene. Because the heater is assumed to operate at all hours, the short-term and annual emission rates are equal for all pollutants. The comfort heater is a single point source, and all emissions are emitted through that point source.

Please refer to the attached emission calculation tables for a detailed calculation of each emission rate and source parameter.

_____The modeling emissions inventory and the emissions inventory presented in other parts of the permit application are consistent, and if they are not identical numbers, it is clearly shown, with calculations submitted, how the modeled value was derived from the value provided in the emissions inventory.

4.1 Criteria Pollutants

Table 5 below provides a statement of each criteria pollutant emission rate modeled in this analysis. For a full calculation for each of the criteria pollutant emission rates from the VCU, please refer the attached emission calculation tables.

Table 5. Criteria Pollutant Modeling Emission Rates (NO_x)

Emission Source	Heat Rate (Btu/hr)	Annual Emissions		Short-Term Emissions	
		(tpy)	(g/s)	(lb/hr)	(g/s)
VCU	--	9.43	2.711E-01	2.48	3.123E-01
Heater #1	105,000	0.08	2.205E-03	0.02	2.205E-03
Total		9.50	2.733E-01	2.50	3.145E-01

4.1.1 Modeled Emissions Rates for Significant Impact Level Analyses

Table 6 below provides a statement of each criteria pollutant emission rate modeled in the Significant Impact Level (SIL) analysis. For a full calculation for each of the criteria pollutant emission rates from the VCU and heater, please refer the attached emission calculation tables.

Source ID	Source Description	Pollutant	Averaging Period	Emissions ^a (lb/hr)
VCU	Vapor Combustion Unit	NO _x	1-hour	2.48
			Annual	2.15

^a Pound/hour emissions rate modeled is the project-specific increase in potential/allowable emissions increase for the averaging period specified for the pollutant.

_____ Emissions rates in Table 6 are identical to those in the model input files for SIL analyses.

_____ Calculation of modeled emissions are thoroughly documented in this section, and any unique handling of emissions in the model have been described.

4.1.2 Modeled Emissions Rates for Cumulative Impact Analyses

Table 7 below provides a statement of each criteria pollutant emission rate modeled in the cumulative NAAQS analysis. For a full calculation for each of the criteria pollutant emission rates from the VCU and heater, please refer the attached emission calculation tables.

Because the associated PTC application will treat the VCU as a new source, the VCU's PTE emission rate is used in both the SIL and NAAQS analyses. In the NAAQS analysis, the FURN source representing the comfort heater is included for completeness. No other NO_x sources are located at the terminal.

Source ID	Source Description	Pollutant	Averaging Period	Emissions ^a (lb/hr)
VCU	Vapor Combustion Unit	NO _x	1-hour	2.48
			Annual	2.15
FURN	Comfort Heater	NO _x	1-hour	0.0175
			Annual	0.0175

^a. Pound/hour emissions rate modeled is the project-specific increase in potential/allowable emissions increase for the averaging period specified for the pollutant.

_____ Emissions rates in Table X are identical to those in the model input files for the cumulative NAAQS impact analyses.

_____ Calculation of modeled emissions are thoroughly documented in this section (unless already described in Section 4.1.1), and any unique handling of emissions in the model have been described.

4.1.3 NO₂/NO_x Ratio for NO_x Chemistry Modeling

A constant NO₂ / NO_x ambient concentration ratio is used in the modeling analysis following the Ambient Ratio Method (ARM). NO_x results are converted to NO₂ results using a scaling factor of 0.75 for annual and 0.8 for 1-hour NO_x model outcomes. ARM2, OLM, and PVMRM options are not used in this modeling analysis.

4.1.4 Special Methods for Modeling Criteria Pollutant Emissions

No special methods other than ARM are used in this criteria pollutant modeling analysis.

4.2 Toxic Air Pollutants

Table 8 lists TAP emissions rates that were included in modeling analyses. Modeling was performed for each TAP having total project emissions exceeding the TAP-specific Screening Emissions Level (EL) and will not be regulated under a NESHAP at the time of permit issuance, as described in Section 3.3 above.

Source ID	Source Description	TAP	Averaging Period	Emissions ^a (lb/hr)
VCU	VCU	Benzene	annual	1.995E-04
		Naphthalene	annual	2.836E-04

BAY1_1	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	1.662E-05
BAY1_2	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	1.662E-05
BAY1_3	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	1.662E-05
BAY2_1	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	1.662E-05
BAY2_2	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	1.662E-05
BAY2_3	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	1.662E-05
BAY3_1	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	1.662E-05
BAY3_2	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	1.662E-05
BAY3_3	Fugitive Emissions from Loading Rack	Benzene	annual	0
		Naphthalene	annual	1.662E-05
BAYT_1	Fugitive Emissions from Transmix Bay	Benzene	annual	6.584E-05
		Naphthalene	annual	5.949E-08
BAYT_2	Fugitive Emissions from Transmix Bay	Benzene	annual	6.584E-05
		Naphthalene	annual	5.949E-08
BAYT_3	Fugitive Emissions from Transmix Bay	Benzene	annual	6.584E-05
		Naphthalene	annual	5.949E-08
FURN	Comfort heater (natural gas)	Benzene	annual	2.162E-07
		Naphthalene	annual	6.279E-08

^a Pounds/hour emissions rate modeled is the project-specific increase in potential/allowable emissions increase for the averaging period specified for the TAP.

____TAP emissions rates have been listed for each TAP that has project cumulative emissions exceeding the applicable EL.

____Emissions rates in Table 8 are identical to those in the model input file for TAP analyses.

4.3 Emissions Release Parameters

Table 9 lists stack parameters for point sources and Table 10 lists release parameters for volume and area sources.

Release Point	Description	UTM ^a Coordinates		Stack Height (m)	Stack Gas Flow Temp. (K) ^c	Stack Gas Flow Velocity (m/sec) ^d	Modeled Stack Diameter (m)	Orient. Of Release ^e
		Easting-X (m) ^b	Northing-Y (m)					
VCU	VCU	374718	4752779	10.67	592.59	0.99	2.44	V
FURN	Comfort heater (natural gas)	374745	4752746	4.27	Ambient	1.92	7.62E-02	V

- a. Universal Transverse Mercator.
- b. Meters.
- c. Kelvin.
- d. Meters per second.
- e. Vertical uninterrupted, rain-capped, or horizontal release.

Coordinates for the point sources are given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility. Release height and stack diameter for the VCU and comfort heater stack are based on measurements at the Pocatello site.

The VCU exhaust temperature estimate is based on an attached source test (November 9, 2001) for the VCU. Stack exit velocity is based on an exhaust rate of 1,737,594 scf over the 6-hour test duration. Full calculations are provided in the attached calculation tables.

The furnace exhaust velocity is based on converting 0.105 MMBtu/hr to exhaust gas using EPA Method 19. Exhaust temperature is unknown, so an ambient temperature is conservatively selected. Full calculations are provided in the attached calculation tables.

Both stacks are equipped with uncapped vertical release points.

Source	Description	UTM ^a Coordinates		Release Height (m)	Horizontal Dimension (m)	Vertical Dimension (m)
		Easting - X (m) ^a	Northing - Y (m)			
BAY1_1	Fugitive Emissions from Loading Rack	374838	4752760	1.63	1.13	1.51
BAY1_2		374836	4752760	1.63	1.13	1.51
BAY1_3		374834	4752760	1.63	1.13	1.51
BAY2_1		374838	4752750	1.63	1.13	1.51
BAY2_2		374836	4752750	1.63	1.13	1.51
BAY2_3		374834	4752750	1.63	1.13	1.51
BAY3_1		374838	4752740	1.63	1.13	1.51
BAY3_2		374836	4752740	1.63	1.13	1.51
BAY3_3		374834	4752740	1.63	1.13	1.51
BAYT_1	Fugitive	374838	4752732	1.63	1.13	1.51

BAYT_2	Emissions from Transmix Bay	374836	4752732	1.63	1.13	1.51
BAYT_3		374834	4752732	1.63	1.13	1.51

^{a.} Universal Transverse Mercator

^{b.} Meters

Coordinates for the loading rack are given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility. Coordinates of the individual volume sources are based on the three product loading bays and the single transmix loading / ethanol offloading bay at the loading rack. Based on the plot plans and aerial imagery, the centerlines of each bay are 10 m apart. The bays run east to west. Therefore, Bay 1 is 31 ft north of Bay 2, and Bay 3 is 31 ft south. With regard to the number and spacing of volume sources: each tank truck is approximately 8.0 feet wide. This width is used to define volume source spacing as described in EPA's AERMOD user guide, Table 3-1, and EPA's 1995 ISCST3 model user guide, Figure 1-8a. According to this figure, each volume source is to be spaced 8.0 feet apart. Each truck is approximately 23 ft long. $23 \text{ ft} / 8.0 \text{ ft} = 2.875$, so three volume sources are used to represent each bay. The volume sources are located with reference to the center of the loading rack: one 8 ft west of the centerline, one located on the centerline, and one 8 ft east of the centerline for each bay.

Volume source initial vertical dimensions are based on the estimated height of a gasoline tank truck. The tank truck height is set to 3.25 meters, and the central release height is taken to be the middle of the truck. Volume source initial lateral dimension is calculated as the truck width / 2.15, as described in footnote a, for adjacent volume sources forming a line source, in accordance with the State of Idaho Modeling Guideline. Each volume source in the adjacent sources is identical.

____ Thorough justification/documentation of release parameters for all modeled sources is provided in this section.

____ The specific methods used to determine/calculate given release parameters is described in this section.

____ The release orientation of all point source stacks (horizontal, rain-capped, or uninterrupted vertical release) has been verified and is documented in this section.

5.0 Modeling Methodology

Table 11 summarizes the key modeling parameters used in the impact analyses.

Parameter	Description/Values	Documentation/Addition Description
General Facility Location	Attainment	The facility is in attainment of NO ₂ NAAQS. Background concentrations of NO ₂ are well below NAAQS design values.
Model	AERMOD	AERMOD with the PRIME downwash algorithm, version 15181.

Meteorological Data	KPIH (WBAN 24156) surface data With KBOI (WBAN 24131) upper air data	The meteorological model input files for this project were developed by Cheryl Robinson (IDEQ) using AERMET 12345. See Section 5.2 of this memorandum for additional details of the meteorological data.
Terrain	Considered	3-dimensional receptor coordinates were obtained from USGS National Elevation Dataset (NED) files and were used to establish elevation of ground level receptors. AERMAP was used to determine each receptor elevation and hill height scale.
Building Downwash	Considered	Plume downwash was considered for all structures associated with the facility. BPIP-PRIME was used to evaluate building dimensions for consideration of downwash effects in AERMOD. Building parameters are provided in Section 5.5 and in the attached calculation tables. No buildings were excluded from the BPIP-PRIME analysis.
NOx Chemistry	ARM	A straightforward ARM approach is used to scale NO ₂ results from NO _x results, using 0.75 for annual results and 0.8 for 1-hour results.
Receptor Grid	Significant Impact Analyses	
	Grid 1	10-meter spacing along the ambient air boundary
	Grid 2	10-meter spacing in a 1,500 meter (easting) by 1,500 meter (northing) grid centered on the facility
	Grid 3	25-meter spacing in a 2,000 meter (easting) by 2,000 meter (northing) grid centered on the facility
	Grid 4	50-meter spacing in a 4,000 meter (easting) by 4,000 meter (northing) grid centered on the facility
	Grid 5	100-meter spacing in a 16,000 meter (easting) by 16,000 meter (northing) grid centered on the facility
	NAAQS Analyses	
	The same receptor grid is used for both SIL and NAAQS analyses.	
	TAPs Analyses	
The receptor grid for TAP is equivalent to Grid 1 and Grid 2 mentioned above. TAP impacts occur close to the fenceline as they are primarily emitted from fugitive sources.		

5.1 Model Selection

EPA's AERMOD near-field Gaussian dispersion model, version 15181, was used to prepare this analysis.

National Elevation Dataset (NED) data with 1/3 arc-second resolution was processed using EPA's AERMAP terrain preprocessor, version 11103.

IDEQ provided meteorological data processed with EPA's AERMET meteorological pre-processor, version 12345. The meteorological data is IDEQ's preferred data set.

_____The current versions of all models and associated programs were used in analyses, or alternate versions were specifically approved by DEQ.

_____Any non-default model options used were approved by DEQ in advance.

5.2 Meteorological Data

IDEQ provided model-ready meteorological data from 2008 to 2012, processed with EPA's AERMET meteorological pre-processor. IDEQ's data processing report and input files are attached. The meteorological model input files for this project were developed by Cheryl Robinson (IDEQ) using AERMET 12345. IDEQ relied on raw meteorological surface station observations from station KPIH (WBAN 24156) and raw upper air observations from upper-air station KBOI (WBAN 24131).

_____ Meteorological data files are provided with the application.

_____ If meteorological data used for modeling were not provided by DEQ, then a detailed discussion of the data is provided along with documentation of the processing steps.

5.3 Effects of Terrain

NED terrain data were retrieved in GeoTIFF format, in the NAD83 datum, from the Multi-Resolution Land Characteristics (MRLC) Consortium online viewer at <http://www.mrlc.gov/viewerjs/>. Data were retrieved in 1/3-arc-second format. All model elements including sources and buildings are georeferenced with respect to the NAD83 datum.

_____ The datum of terrain data, building corner locations, emissions sources, and the ambient air boundary are specified and are consistent such that the modeled plot plan accurately represents the facility and surroundings.

5.4 Facility Layout

Figures 2 and 3 provide georeferenced plots of the terminal's buildings and sources on aerial imagery of the terminal. Figure 2 indicates the locations of point sources with labels, while Figure 3 indicates the locations of all point sources, volume sources, and buildings.



Figure 2. Aerial Image of Pocatello Terminal

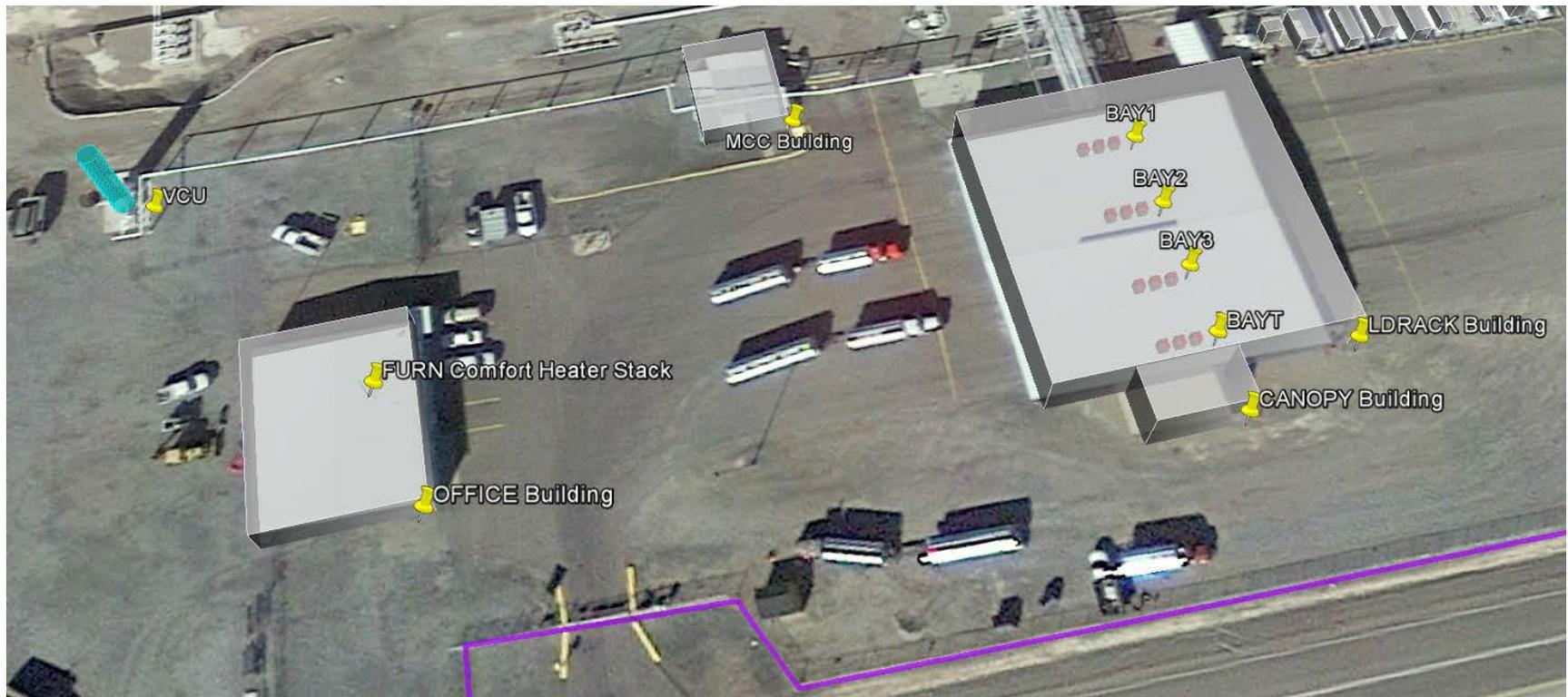


Figure 3. Aerial Image of Pocatello Terminal Emission Sources

_____The facility layout plot plan is provided in this section that clearly and accurately depicts buildings, emissions points, and the ambient air boundary.

_____This section of the Modeling Report has thoroughly described how locations of emissions sources, building corners, and the ambient air boundary were determined, specifying the datum used.

5.5 Effects of Building Downwash

Building location data were obtained by georeferencing buildings using aerial imagery. The outcome of the georeferencing process is visible in Figures 2 and 3.

Building height data were obtained from on-site facility measurements of tanks and structures. A full set of building heights is provided in the attached calculations.

All buildings at the facility were processed using BPIP-PRIME. No buildings were removed from the analysis based on distance from stacks.

5.6 Ambient Air Boundary

The ambient air boundary is marked in purple in Figure 2. The selection of the ambient boundary is straightforward. It follows the facility boundary fence closely. The facility's fence and accompanying signage deter public access. The modeling analysis does not exclude receptors from any leased property. The facility does not admit the general public to the facility as part of its business operations.

_____If any of the following apply, the effect on areas excluded from ambient air is thoroughly described in this section: a river/stream bisecting the facility; the facility is on leased property or is leasing property to another entity; the facility is not completely fenced; there are right-of-way areas on the facility; the nature of business is such that the general public have access to part or all of the facility.

_____This section thoroughly describes how the facility can legally preclude public access (and practically preclude access) to areas excluded from ambient air in the modeling analyses.

5.7 Receptor Network

The extent of the receptor grids is provided in Table 11.

IDEQ's Modeling Guideline suggests three criteria on which to evaluate the adequacy of a receptor grid:

- Whether the modeled concentrations are reasonably close to a threshold value;
- How much the receptor with the maximum modeled concentration exceeds its neighbors; and
- Whether the terrain features nearby the modeling domain may cause higher impacts outside the modeling domain.

With regard to threshold values, no modeled concentration is expected to approach within 10% of a threshold value.

With regard to the excess of the maximum modeled concentration over its neighboring receptors, it is not expected that model results will have a steep gradient. Benzene and naphthalene impacts will arise primarily from volume sources within the facility fenceline. NO₂ impacts will arise from a plume. When model files are submitted with the permit application, a justification of the receptor grid in quantitative terms will be provided. A receptor grid spacing of 10 m, extending from the terminal fenceline to the grid of 1,500 m square centered on the facility, is expected to capture all points of peak impact.

With regard to terrain features, as described in Section 2.2, terrain within the modeling domain is flat except for some hilly land near the south edge (~6 km from the terminal). Benzene and naphthalene impacts are due to volume sources, so transport of the pollutants to 6 km is not expected. NO₂ impacts may occur at longer ranges; however, previously submitted modeling for the Boise, ID terminal indicates that a fenceline 1-hour impact is likely to remain higher than any impacts at long range.

_____ This section of the Modeling Report provides justification that receptor spacing used in the air impact analyses was adequate to reasonably resolve the maximum modeled concentrations to the point that NAAQS or TAP compliance is assured.

5.8 Background Concentrations

A background concentration is used in the cumulative analysis for NO₂. The backgrounds are determined at the terminal's center: 374,809.5 m E, 4,752,788 m N, UTM Zone 12 (NAD83). The backgrounds are determined using a publicly available, online tool developed by the Washington State University Laboratory for Atmospheric Research's Northwest International Air Quality Environmental Science and Technology Consortium (NW-AIRQUEST; <http://www.lar.wsu.edu/index.html>). The following data were retrieved:

- 1-Hour NO₂: 18 ppb (33.9 µg/m³)
- Annual NO₂: 3.9 ppb (7.34 µg/m³)

_____Background concentrations have been thoroughly documented and justified for all criteria pollutants where a cumulative NAAQS impact analysis was performed.

5.9 NO_x Chemistry

A constant NO₂ / NO_x ambient concentration ratio is used in the modeling analysis following the Ambient Ratio Method (ARM). NO_x results are converted to NO₂ results using a scaling factor of 0.75 for annual and 0.8 for 1-hour NO_x model outcomes. ARM2, OLM, and PVMRM options are not used in this modeling analysis.

_____If OLM or PVMRM was used to address NO_x chemistry, reasons for selecting one algorithm over the other are provided in this section.

6.0 Results and Discussion

Results of the model analysis described in this protocol are forecast in a preliminary manner below. Final results will be presented in the model report after IDEQ protocol comments are addressed.

6.1 Criteria Pollutant Impact Results

6.1.1 Significant Impact Level Analyses

Results of the annual and 1-hour NO₂ SIL analysis are forecast to exceed the respective SILs.

No multiple operational scenarios are used in this modeling analysis.

Table 12 provides forecasts results of the SIL analyses. Values are adjusted to reflect the ARM (0.75 scaling factor for annual results; 0.8 scaling factor for 1-hour results).

Pollutant	Averaging Period	Maximum Modeled Concentration (µg/m³)^a	Significant Contribution Level (µg/m³)	Impact Percentage of Significant Contribution Level	Cumulative NAAQS Analysis Required
NO ₂ ^d	1-hour	52.06 ^g	7.5	692%	Yes
	Annual	3.57	1.0	357%	Yes

^a. Micrograms/cubic meter

^b. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.

^c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.

^d. Nitrogen dioxide.

^e. Sulfur dioxide.

^f. Carbon Monoxide.

^g. Maximum 5-year means (or a lesser averaging period if less than 5 years of meteorological data were used in the analyses) of the maximum modeled concentration for each year modeled.

_____ Model input and output files for SIL analyses have been provided with the application, with descriptions of the analyses associated with those files.

6.1.2 Cumulative NAAQS Impact Analyses

Results of the annual and 1-hour NO₂ cumulative NAAQS analysis are forecast to demonstrate compliance with the NAAQS. The NAAQS analysis forecast results presented below are presented using all receptors available in the SIL receptor grids (no receptors eliminated). As shown in Table 13, results are not expected to approach the NAAQS by more than 35%. No time-and-space pairing is required to demonstrate compliance with the NAAQS.

Table 13 provides forecasts of results of Cumulative NAAQS Impact analyses. Values are adjusted to reflect the ARM (0.75 scaling factor for annual results; 0.8 scaling factor for 1-hour results).

Pollutant	Averaging Period	Modeled Design Concentration ($\mu\text{g}/\text{m}^3$)^a	Background Concentration ($\mu\text{g}/\text{m}^3$)	Total Impact ($\mu\text{g}/\text{m}^3$)	NAAQS ($\mu\text{g}/\text{m}^3$)
NO ₂ ^d	1-hour	32.59 ^g	33.84	66.43 ^g	188
	Annual	3.57	7.33	10.91	100
<p>a. Micrograms/cubic meter</p> <p>b. Particulate matter with an aerodynamic diameter less than or equal to a nominal 2.5 micrometers.</p> <p>c. Particulate matter with an aerodynamic diameter less than or equal to a nominal 10 micrometers.</p> <p>d. Nitrogen dioxide.</p> <p>e. Sulfur dioxide.</p> <p>f. Carbon Monoxide.</p> <p>g. Maximum of 5-year means (or a lesser averaging period if less than 5 years of meteorological data were used in the analyses) of 8th highest modeled concentrations for each year modeled.</p> <p>h. Maximum of 5-year means (or a lesser averaging period if less than 5 years of meteorological data were used in the analyses) of maximum modeled concentrations for each year modeled.</p> <p>i. Maximum of 6th highest modeled concentrations for a 5-year period (or the maximum of the 2nd highest modeled concentrations if only 1 year of meteorological data are modeled).</p> <p>j. Maximum of 5-year means (or a lesser averaging period if less than 5 years of meteorological data were used in the analyses) of 4th highest modeled concentrations for each year modeled.</p> <p>k. Maximum of 2nd highest modeled concentrations for each year modeled.</p>					

_____ Model input and output files for the cumulative NAAQS impact analyses are provided with the application.

_____ If there were modeled NAAQS violations, all violations were analyzed and clearly show that the project did not significantly contribute to those modeled violations. If there were multiple violations at a given receptor, all cumulative impacts (including background) for the averaging period analyzed were ranked along with the project contribution, and the project contributions were below the applicable SIL. A table was included to show all ranked impacts above the NAAQS along with the project contribution.

6.2 TAP Impact Analyses

Table 14 provides forecast results for TAP impact analyses.

TAP	Averaging Period	Maximum Modeled Impact ($\mu\text{g}/\text{m}^3$)^a	AAC or AACC ($\mu\text{g}/\text{m}^3$)
Benzene	Annual	0.0288	0.12
Naphthalene (As PAC)	Annual	0.00164	0.014

a. Micrograms/cubic meter.

7.0 Quality Assurance/Control

Model inputs and forecast results in this report have been reviewed in Trinity's Seattle office by qualified engineering consultants with air dispersion modeling experience.

Table H-1a. Modeled Point Source Parameters for VCU

Point Sources	Description	Source	UTM East ^a (m)	UTM North ^a (m)	Elevation ^b (m)	Release Height ^c (m)	Release Temp ^d (K)	Velocity ^e (m/s)	Diameter ^c (m)	Modeled Annual Emissions			
										NO _x Emissions (g/s) Short-Term	NO _x Emissions (g/s) Annual	Naphthalene (g/s)	Benzene (g/s)
VCU	Stack Emissions from VCU	POINT	374718	4752779	1350.93	10.67	592.59	0.99	2.44	3.123E-01	2.711E-01	2.190E-06	2.514E-05

^a Coordinates for point source are given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.

^b Source elevations based on output from EPA's AERMAP elevation software, version 11103. AERMAP computed these elevations based on seamless NED data covering the area around the site. Data obtained from the United States Geological Survey via the MRLC Consortium seamless server.

^c Release height and stack diameter based on measurements at the Pocatelito site.

^d Online temperature data is not recorded from this stack. The temperature estimate is based on a source test (November 9, 2001) for the VCU.

607 °F

^e Stack exit velocity calculated from measured source test value (November 9, 2001):

$$\text{exit velocity} = (\text{flow rate, scf} / \text{source test time, hr} * (\text{stack temp.} / (\text{standard temp.})) * (0.3048 \text{ m} / \text{ft})^3 / (\pi/4 * (\text{stack diameter, m})^2) * (1 \text{ hr} / 3,600 \text{ s}))$$

1,737,594 scf emitted over

6 hours

A temperature of

68 °F is used as the standard temperature to convert to acf, based on EPA Method 2.

Table H-1b. Modeled Product Loading Sources

Volume Sources	Description	Source	UTM East ^a (m)	UTM North ^a (m)	Elevation ^b (m)	Release Height ^c (m)	Initial Lateral Dimension ^c (m)	Initial Vertical Dimension ^c (m)	Modeled Annual Emissions ^d	
									Benzene (g/s)	Naphthalene (g/s)
Loading Rack	Center of Loading Rack	-	374836	4752748	-	-	-	-	0.000E+00	4.971E-07
BAY1_1	Fugitive Emissions from Loading Rack	VOLUME	374838	4752760	1350.15	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY1_2	Fugitive Emissions from Loading Rack	VOLUME	374836	4752760	1350.17	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY1_3	Fugitive Emissions from Loading Rack	VOLUME	374834	4752760	1350.19	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY2_1	Fugitive Emissions from Loading Rack	VOLUME	374838	4752750	1350.26	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY2_2	Fugitive Emissions from Loading Rack	VOLUME	374836	4752750	1350.28	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY2_3	Fugitive Emissions from Loading Rack	VOLUME	374834	4752750	1350.31	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY3_1	Fugitive Emissions from Loading Rack	VOLUME	374838	4752740	1350.41	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY3_2	Fugitive Emissions from Loading Rack	VOLUME	374836	4752740	1350.41	1.63	1.13	1.51	0.000E+00	5.524E-08
BAY3_3	Fugitive Emissions from Loading Rack	VOLUME	374834	4752740	1350.42	1.63	1.13	1.51	0.000E+00	5.524E-08
BAYT_1	Fugitive Emissions from Transmix Bay	VOLUME	374838	4752732	1350.49	1.63	1.13	1.51	8.268E-07	7.471E-10
BAYT_2	Fugitive Emissions from Transmix Bay	VOLUME	374836	4752732	1350.49	1.63	1.13	1.51	8.268E-07	7.471E-10
BAYT_3	Fugitive Emissions from Transmix Bay	VOLUME	374834	4752732	1350.5	1.63	1.13	1.51	8.268E-07	7.471E-10

^a Coordinates for the loading rack are given in UTM Zone 12 with NAD 1983 projection. The coordinates in the first row are the center of the rack, in the middle bay. Coordinates were established using aerial imagery and attached plot plans of the facility. Coordinates of the individual volume sources are based on the three product loading bays and the single transmix loading / ethanol offloading bay at the loading rack. Based on the plot plans and aerial imagery, the centerlines of each bay are 10 m apart. The bays run east to west. Therefore, Bay 1 is 31 ft north of Bay 2, and Bay 3 is 31 ft south. With regard to the number and spacing of volume sources: each tank truck is approximately 8.0 feet wide. This width is used to define volume source spacing as described in EPA's AERMOD user guide, Table 3-1, and EPA's 1995 ISCST3 model user guide, Figure 1-8a. According to this figure, each volume source is to be spaced 8.0 feet apart. Each truck is approximately 23 ft long. $23 \text{ ft} / 8.0 \text{ ft} = 2.875$, so three volume sources are used to represent each bay. The volume sources are located with reference to the center of the loading rack: one 8 ft west of the centerline, one located on the centerline, and one 8 ft east of the centerline for each bay.

Length of truck + trailer: 7.01 m = 23.0 ft

Width of truck: 2.44 m = 8.0 ft

Number of volume sources per bay: 3

Height of truck: 3.25 m = 10.67 ft

Volume source release height: 1.6 m = 5.3 ft

^b Source elevations based on output from EPA's AERMAP elevation software, version 11103. AERMAP computed these elevations based on seamless NED data covering the area around the site. Data obtained from the United States Geological Survey via the MRLC Consortium seamless server, July 24, 2014. Data is 1/3 arc-second resolution.

^c Volume source initial vertical dimensions are based on the estimated height of a gasoline tank truck. The tank truck height is set to 3.25 meters, and the central release height is taken to be the middle of the truck. Volume source initial lateral dimension is calculated as the truck width / 2.15, as described in footnote a, for adjacent volume sources forming a line source, in accordance with the State of Idaho Modeling Guideline. Each volume source in the adjacent sources is identical.

^d Emission rates of each species are calculated by equally apportioning the loading rack emissions.

Table H-1c. Modeled Furnace Source

Volume Sources	Description	Source	UTM East ^a (m)	UTM North ^a (m)	Elevation ^b (m)	Release Height ^c (m)	Release Temp ^d (K)	Velocity ^e (m/s)	Diameter ^c (m)	NO _x Emissions (g/s)		Modeled Annual Emissions	
										Short-Term	Annual	Benzene (g/s)	Naphthalene (g/s)
FURN	Comfort heater (natural gas)	POINT	374745	4752746	1351.34	4.27	0	1.92	7.62E-02	2.205E-03	2.205E-03	2.724E-08	7.912E-09

^a Coordinates for the furnace stack source are given in UTM Zone 12 with NAD 1983 projection.

^b Source elevations based on output from EPA's AERMAP elevation software, version 11103. AERMAP computed these elevations based on seamless NED data covering the area around the site.

^c Release height and stack diameter based on on-site measurements (November 12, 2015).

^d Release temperature not specified in the heater specifications, so a conservative ambient temperature setting is used. This temperature setting is represented with a "0" in the input file for EPA's AERMOD model.

^e Velocity for the furnace is calculated below:

Heater Capacity	0.105 MMBtu/hr
Exhaust Factor	10,610 wscf/MMBtu (EPA Method 19)
Exhaust Gas	1,114 wscf/hr
	31.55 scm/hr
Stack Diameter	0.076 m
Stack Cross-Sectional Area	0.0046 sq. m
Stack Exit Velocity	1.92 m/s

Table H-1d. Coordinates Used to Obtain Elevation Data

Location	UTM East ^a (m)	UTM North ^a (m)	Longitude	Latitude
Center of Facility	374809.5	4752788	-112.53386	42.91744
Point NE of Center	394809.5	4772788	-112.29265	43.10052
Point SW of Center	354809.5	4732788	-112.77364	42.73388

^a Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. A terrain data range of +/- 10 km from the facility center is used.

Table H-2. Coordinates of Property Fenceline

Location	UTM East ^a (m)	UTM North ^a (m)
NW Corner	374667	4752886
NE Corner	374959	4752880
Point 1	374956	4752709
Point 2	374935	4752710
Point 3	374919	4752699
Point 4	374784	4752703
Point 5	374780	4752714
Point 6	374752	4752715
Point 7	374751	4752696
Point 8	374727	4752697
Point 9	374703	4752708
Point 10	374686	4752724
Point 11	374674	4752744
Point 12	374668	4752763
Point 13	374665	4752785

^a Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.

Table H-3a. Vertical Tank Coordinates and Dimensions

Building Name	Center UTM East ^a (m)	Center UTM North ^a (m)	Shell Height (ft)	Diameter (ft)	Diameter (m)	Radius (ft)
TANK901	374772	4752814	39.34	42.53	12.96	21.26
TANK902	374796	4752813	39.65	42.55	12.97	21.27
TANK903	374819	4752812	39.40	42.54	12.97	21.27
TANK904	374772	4752838	40.02	42.50	12.95	21.25
TANK905	374797	4752838	39.20	42.51	12.96	21.25
TANK906	374820	4752837	39.37	42.52	12.96	21.26
TANK907	374797	4752862	39.57	42.53	12.96	21.27
TANK908	374821	4752862	39.38	42.51	12.96	21.25
TANK909	374855	4752812	48.01	39.99	12.19	20.00
TANK910	374880	4752812	48.00	39.98	12.19	19.99
TANK911	374903	4752810	47.62	56.53	17.23	28.27
TANK912	374856	4752837	48.02	39.98	12.19	19.99
TANK913	374880	4752836	48.00	39.98	12.19	19.99
TANK914	374904	4752835	47.82	48.04	14.64	24.02
TANK915	374881	4752861	47.47	40.02	12.20	20.01
TANK916	374905	4752860	47.43	52.52	16.01	26.26
TANK917	374773	4752863	39.71	60.09	18.31	30.04
TANK918	374856	4752861	47.52	56.53	17.23	28.27
TANK919	374729	4752864	40.00	60.07	18.31	30.04
TANK920	374699	4752865	39.45	60.08	18.31	30.04
TANK921	374743	4752829	47.92	90.02	27.44	45.01
TANK922	374699	4752829	47.99	90.01	27.43	45.00
TANK930	374854	4752788	24.00	21.24	6.47	10.62
TANKA100	374873	4752789	16.00	15.00	4.57	7.50

^a Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.

Table H-3b. Horizontal Tank Coordinates and Dimensions

Building Name	NE Corner UTM East ^a (m)	NE Corner UTM North ^a (m)	Height (ft)	X Length (ft)	Y Length (ft)	Angle
TANKA101	374869	4752774	8.00	8.00	16.00	180
TANKA102	374875	4752774	6.00	6.00	19.00	180
TANKA105	374888	4752772	5.30	5.30	12.00	180
TANKA107	374894	4752772	3.79	3.79	12.00	180
TANKA108	374899	4752775	7.75	7.75	22.00	180
TANKA110	374903	4752773	7.50	7.50	12.00	180
TANKA112	374880	4752774	8.00	8.00	17.42	180
TANKA113	374884	4752774	7.50	7.50	22.00	180
TANKA114	374865	4752773	8.00	8.00	6.00	180

^a Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.

Table H-3c. Building Coordinates and Dimensions

Building Name	NE Corner UTM East ^a (m)	NE Corner UTM North ^a (m)	Height (ft)	X Length (ft)	Y Length (ft)	Angle
LDRACK	374855	4752765	22	120	122	180
CANOPY	374840	4752728	22	39	22	180
MCC	374799	4752785	10	35	44	180
OFFICE	374751	4752754	14	61	76	180

^a Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.