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April 4, 2016

Mr. Bill Rogers
Stationary Source Program Permit Coordinator
Idaho Department of Environmental Quality
1410 N. Hilton St.
Boise, ID 83706

Re: Withdrawal of Permit to Construct Action of March 31, 2014
Tesoro Logistics Operations LLC: Pocatello, ID Terminal, AIRS No. 077-00023

Dear Mr. Rogers:

Tesoro Logistics Operations LLC (Tesoro) hereby withdraws the Permit to Construct (PTC) application, for the Pocatello Terminal, that was originally delivered March 31, 2014 and determined incomplete May 2, 2014. An updated version of this application was delivered May 14, 2014 and determined complete June 17, 2014 (IDEQ assigned this application the permit number P-2014.0008 and IDEQ project number 61344).

Because the VCU was constructed in 1997 and has not previously obtained a PTC, Tesoro hereby replaces the March 31, 2014 PTC application with this revised PTC application, including a modeling applicability assessment and modeling analysis, to address the vapor combustion unit (VCU) as a new source per IDEQ's request on August 4, 2014.

As IDEQ noted in correspondence with TLO on August 4, 2014, the $1,000 filing fee for the March 31, 2014 application remains applicable for this replacement application.

If you have any questions regarding this submittal or require any additional information, please contact Kirt Rhoads at kirt.w.rhoads@tsocorp.com or at (801) 606-2169.

Sincerely,

John Roark

John Roark
Vice President, Mid-Continent Logistics Operations
Tesoro Logistics Operations LLC
19100 Ridgewood Parkway
San Antonio, TX 78259

cc: Mr. Harold Laurence, Trinity Consultants (Seattle, WA)

Attachments

PROJECT REPORT

Tesoro Logistics Operations LLC > Pocatello, ID Terminal

PTC Permit Application

Prepared By:

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April 2016

Project 154801.0005

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1. EXECUTIVE SUMMARY

Tesoro Logistics Operations LLC (TLO) owns and operates a terminal for refined petroleum products located in Pocatello, ID (the Terminal). In June 2013, TLO purchased the Terminal from Chevron Pipe Line Company (Chevron). The Terminal currently operates under Tier II operating permit No. T2-2008.0026 issued by the Idaho Department of Environmental Quality (IDEQ) on September 9, 2008. The Terminal is a synthetic minor source with respect to federal Title V operating permit regulations. The Terminal's Tier II operating permit expired on September 9, 2013.

After holding discussions with IDEQ, TLO has elected to apply for a Permit to Construct (PTC) instead of a Tier II renewal operating permit.[1] By submitting this application and attachments to IDEQ, TLO is requesting that all applicable permit conditions from the current Tier II operating permit be incorporated into a PTC for the facility. This report with the attached appendices serves as the PTC application for submittal to IDEQ and includes all information required under Idaho Administrative Procedures Act (IDAPA) 58.01.01.202. IDEQ application forms are provided in Appendix A.

TLO submitted the $1,000 application fee required by IDAPA 58.01.01.224 during the original submittal of the PTC application for the Terminal on March 31, 2014. On August 4, 2014, IDEQ recommended that TLO withdraw the original PTC application and submit a new application to include the evaluation of emissions from the VCU. Appendix G contains correspondence with IDEQ that states that the previous PTC application fee is applicable to the new PTC application. As outlined in IDAPA 58.01.01.225, TLO will pay additional processing fees as requested by IDEQ.

The PTC application includes the following elements:

- Section 2. Facility Description
- Section 3. Emission Calculations
- Section 4. Regulatory Review
- Appendix A: IDEQ Application Forms
- Appendix B: Site Plan
- Appendix C: Potential Emission Calculations
- Appendix D: Tank Emission Calculations
- Appendix E: Safety Data Sheets
- Appendix F: VCU Source Test Report
- Appendix G: Correspondence with IDEQ
- Appendix H: Model Protocol
- Appendix I: Model Report
- Appendix J: Model Results Tables

[1] Conference call with Bill Rogers, IDEQ, on August 6, 2013.

2. FACILITY DESCRIPTION

TLO operates a refined petroleum products terminal located at 1189 Tank Farm Road, at a site west of central Pocatello, Idaho. A site plan for the facility is provided in Appendix B.

The Terminal consists of numerous storage tanks, a loading rack controlled by a vapor combustion unit (VCU), and various equipment components such as valves, flanges, pumps, and connectors. The VCU is a source of volatile organic compounds (VOC), nitric oxides (NO_X), carbon monoxide (CO), and greenhouse gas (GHG) emissions. VOC emissions also occur from product storage, product loading, and as fugitives from equipment leaks.

The Terminal consists of seventeen tanks for refined petroleum products as well as an additional nine tanks for product additives.

Table 2-1. Facility-Wide Tank Product Storage Information

Tank Number	Roof Type	Products Stored [a]	Construction Date
901	Fixed	Diesel	1963
902	IFR	Transmix	1963
903	Fixed	Diesel	1963
905	Fixed	Diesel	1963
906	Fixed	Diesel	1963
907	IFR	Diesel	1963
908	Fixed	Diesel	1963
911	IFR	Diesel	1963
914	IFR	Gasoline	1963
915	IFR	Gasoline	1963
916	IFR	Ethanol	1963
917	Fixed	Diesel	1963
918	IFR	Diesel	1969
919	IFR	Gasoline	1994
920	IFR	Gasoline	1995
921	IFR	Gasoline	2002
922	IFR	Gasoline	2002
A100	Fixed	Additive	1963
A101	Horizontal	Additive	1963
A102	Horizontal	Additive	1990
A105	Horizontal	Additive	1990
A108	Horizontal	Additive	1990
A110	Horizontal	Additive	1995
A112	Horizontal	Additive	2004
A113	Horizontal	Additive	2004
A114	Horizontal	Additive	2007

[a] List of tanks provided in current Tier II operating permit. Tanks 904, 909, 910, 912, 913, and 930 are not listed in the current permit because the tanks are out of service. Tanks listed as storing "diesel" may be used to store No. 1 and No. 2 fuel oils.

3. EMISSION CALCULATIONS

This section describes methodologies and inputs used to calculate the Terminal's potential to emit (PTE). Of the criteria air pollutants, VOC, NO_X, and CO are the only pollutants expected from the Pocatello facility. Emissions from the loading rack at the Terminal are controlled with a VCU. Particulate matter (PM) and sulfur dioxide (SO_2) emissions from the VCU have historically been considered negligible.[2] Certain compounds in the VOC can be identified as federal Hazardous Air Pollutants (HAP) or IDEQ Toxic Air Pollutants (TAP). The Terminal's calculated PTE for VOC, NO_X, CO, GHG, and speciated organic compounds is included in this report. Detailed calculations of the Terminal's PTE are included in Appendix C.

3.1. PROJECT SCOPE

It is important to note that the purpose of this PTC application is not to permit new or modified sources, but rather to obtain a PTC for the existing sources at existing throughput levels. This PTC application is not associated with any new emission units, physical changes to the Terminal, or changes in the method of operation of the Terminal. The PTE calculations provided herein are provided to support current regulatory applicability and are not intended to represent an emission increase at the Terminal. PTC application requirements relating to emission increases, such as TAP emission thresholds set forth in Sections 585 and 586, do not apply to this permit application.

3.2. POTENTIAL EMISSION CALCULATIONS

Potential emission calculations are prepared on the basis of throughput limits established in Appendix B of the Terminal's current Tier II operating permit.

Table 3-1. Throughput Limits

Source Description	Permitted Throughputs [a] (gallons or barrels per year)	Product Type
Facility gasoline throughput	370,800,990 gal or 8,828,595 bbl	Gasoline
Facility transmix throughput	2,520,000 gal or 60,000 bbl	Transmix
Facility diesel throughput	191,453,010 gal or 4,558,405 bbl	Diesel

[a] Values in gallons are reproduced from Appendix B of the current Tier II operating permit. Values in bbl are converted from gal to bbl by dividing by 42 gal/bbl.

In the 2008 Tier II operating permit, maximum throughput limits are given in both gallons and barrels. The limit values in gallons predated the 2008 permit, and the conversion to barrels took place to simplify compliance demonstration for the Terminal. However, the conversion of limits from gallons to barrels was inconsistent for gasoline and diesel limits. TLO proposes that the limits in barrels be expressed as they are calculated in Table 3-1 of this report. This change does not represent an increase in permitted throughput; TLO requests only that current limits be represented consistently.[3] In the PTE calculations approved by IDEQ for the Tier II

[2] For example, PM and SO_2 emissions from the VCU are not reported in Table 3.2 of the August 1, 2008, Statement of Basis prepared by IDEQ for the Terminal's current Tier II permit.

[3] The original limits, expressed in gallons and numerically equivalent to the limits in gallons used in this application, can be found in Section 4.10 (p. 23) of the August 1, 2008, Statement of Basis, prepared by IDEQ for the Terminal's current Tier II permit.

operating permit in 2008, the throughputs in gallons were used to represent the Terminal's limits. A consistent approach is used in this application.

To calculate the PTE of the loading rack, it is assumed that 100% of throughput is loaded through the loading rack. This approach is consistent with the Tier II renewal application prepared in 2008.

3.2.1. Tanks

Potential emissions of VOC, HAP, and TAP from the tanks in service (901 to 922 and A100 to A114) are estimated using the methodology described in EPA's AP-42 emission factor guide Section 7.1, "Organic Liquid Storage Tanks".

Emissions from tank losses are based on normal operation, i.e. standing losses and working losses, at the maximum throughputs in Table 3-1. TLO will limit VOC emissions associated with normal standing and working losses not to exceed the PTE for tanks given in Table 3-3 below.

A detailed tank emission calculation is included in Appendix D.

Petroleum Environmental Research Forum (PERF) speciations for conventional gasoline and diesel fuel, consistent with historical PTE calculations for the Terminal, are used to represent the partial speciation of the fuel liquids stored in the tanks. Transmix composition is taken to be a weighted average of the speciated compounds of diesel and gasoline, assuming 50 wt% of each liquid in the gasoline-diesel pipeline interface that is stored as transmix. A partial speciation of denatured ethanol is prepared by assuming that denatured ethanol contains 3.36% gasoline by volume. Most additives are comprised of organic compounds in a light aromatic solvent naphtha solution, which is assumed to be 100% xylene for conservatism in calculating vapor pressure of the additives. Proprietary compounds are also treated as 100% xylene for conservatism in calculating vapor pressure. The speciation of each fuel additive in use at the Terminal is conservatively assumed to be 100% HAP. The SDS for each additive used at the Terminal are included in Appendix E, except for Afton HiTEC 6610.

To calculate the PTE of all tanks at the facility, the throughputs in Table 3-1 are apportioned among all tanks in the service of each product. Throughputs are assigned in proportion to the volume of each tank, such that all tanks in the same service have equal numbers of tank turnovers per year. Maximum ethanol throughput at the facility is considered to be 11.1% by volume of maximum permitted gasoline throughput, which represents blending the total gasoline throughput to E-10 gasoline.

3.2.2. Loading Rack Fugitives

Potential fugitive emissions of VOC, HAP, and TAP from the loading rack are estimated using the calculation methodology described in EPA's AP-42 emission factor guide, Chapter 5.2, "Transportation and Marketing of Petroleum Liquids". The loading rack is used to load gasoline (including ethanol blends), diesel, and transmix. Ethanol is blended with the gasoline to produce E-10, a fuel blend of ten percent ethanol by volume, and this blend is loaded at the rack. The potential fugitive emission calculation assumes that the throughput of each product is equal to the product's annual throughput limit shown in Table 3-1.

This methodology relies on the equation,

$$L_L = 12.46 \frac{S\ P\ M}{T} (1 - eff.)$$

where L_L is the total uncontrolled loading loss emission factor in pounds of vapor per 1,000 gallons product loaded (lb/Mgal), S is the saturation factor for the loading losses, P is the true vapor pressure of the petroleum product (psia), M is the molecular weight of the petroleum product vapor (lb/lbmol), and T is the ambient temperature (°R). As discussed below, a vapor collection system connected to the VCU will be used to control the loading losses. Therefore, fugitive (or uncaptured) loading loss emissions are equal to L_L multiplied by one minus the capture efficiency of the vapor collection system. The MACT-level leak test is required, so the capture efficiency is assumed to be 99.2%.[4]

3.2.3. Vapor Combustion Unit

Vapors captured from truck loading are routed to a VCU. It is assumed the VCU has a 95% destruction efficiency for hydrocarbons and meets the MACT standard of 10 mg/L for VCU emissions.[5] The source test report for the VCU is included in Appendix F.

VOC that is not destroyed is emitted from the VCU. VOC emissions are computed as the product of VOC captured at the loading rack and the assumed 95% destruction efficiency of the unit.[5] The VCU's vendor has guaranteed that emissions from the unit do not exceed 10 mg CO and 4 mg NO_X per liter of product loaded (mg/L). Emissions of NO_X and CO are computed as the product of these emission factors and the facility's potential throughput shown in Table 3-1. Consistent with the 2008 statement of basis for the current Tier II operating permit, emissions of particulate matter and SO_2 are treated as negligible.[6]

3.2.4. Fugitive Equipment Leaks

Equipment components at the Terminal may leak a small amount of VOC, including speciated HAP and TAP, during operation. The number of equipment components installed at the Terminal is shown in Table 3-2. The EPA emission factors for marketing terminals are used to calculate emissions for all equipment components. [7] Annual potential emissions are calculated assuming a continuous operation of 8,760 hrs/yr.

Table 3-2. Number of Fugitive Components

Equipment Component	Service	Component Count
Valves	Liquid	1,265
Valves	Vapor	33
Fittings	Liquid	1,265
Fittings	Vapor	110
Pump Seals	Liquid	61
Others	Liquid	98

[4] A 99.2% capture efficiency is provided in AP-42 Chapter 5.2, Section 5.2.2.1.1, and is based on the assumption that the system passes the MACT-level annual leak test.

[5] Average of 90% and 99% range for recovery unit control efficiencies, provided in AP-42 Section 5.2, p.5.2-6.

[6] Table 3.2, p. 6, of the Statement of Basis for Tier II operating permit No. T2 2008.0026 issued by the IDEQ on September 9, 2008.

[7] Emission factors are from Table 2-3 in EPA's *Protocol for Equipment Leak Emission Estimates*, published in November 1995.

3.2.5. Comfort Heater

Emissions from the comfort heater are calculated by applying external combustion emission factors for natural gas (AP-42 Section 1.3) to the Btu/hr nameplate capacity of the comfort heater. For conservatism it is assumed that the comfort heater will operate continuously at full capacity.

3.3. SPECIATED EMISSIONS

Speciated emissions are computed for each emission point at the facility. Speciated VOC emissions from the fugitive loading losses and VCU stack are calculated for annual loading of each product (gasoline, diesel, transmix). Transmix composition is taken to be a weighted average of the speciated compounds in diesel and gasoline. Raoult's Law is used to compute vapor speciation from liquid speciation for each component. A complete table of liquid and vapor speciation calculations is included in Appendix C.

Speciated emissions from storage tanks are calculated using AP-42 Chapter 7.1 emission calculation methods, as described above.

3.4. EMISSION SUMMARY

Table 3-3 summarizes the PTE of the Terminal for criteria air pollutants, GHG, and HAP.

Table 3-3. Pocatello Terminal PTE Summary

Emission Sources	NO_X (tpy)	VOC (tpy)	CO (tpy)	Total HAP (tpy)
Tank Losses [a]	---	23.07	---	1.30
Fugitive Fittings [a]	---	1.11	---	0.21
Loading Rack Fugitives [a]	---	5.12	---	0.11
Truck Rack VCU [a]	9.43	15.72	23.56	0.33
TOTAL Potential to Emit	**9.43**	**45.03**	**23.56**	**1.95**
Permit Limit [b]	--	49.8	--	--
Tier I Threshold [c]	100	100	100	25
Tier I Permit Required?	NO	NO	NO	NO
Loading Rack + VCU Potential to Emit	9.43	20.84	23.56	0.45
PSD Major Source Threshold [d]	250	250	250	--
PSD Applicable?	NO	NO	NO	--

[a] Emission calculations are provided in Appendix C. Summary tables provided in Tables C-1a through C-1c.
[b] VOC emission limits are specified in Appendix A of the facility's current Tier II operating permit. The emission limit is presented as a facility-wide cap of 49.8 tpy VOC, composed of 20.2 tpy VOC from the truck rack VCU and 29.6 tpy VOC from the storage tanks.
[c] Tier I permitting thresholds are based on rules set forth in IDAPA 50.01.01.008.10.
[d] The sum of loading rack and VCU PTE are compared with the PSD Significant Emission Rates.

Emissions from tank losses are based on normal operation, i.e. standing losses and working losses, at the maximum throughputs in Table 3-1. TLO will limit VOC emissions associated with normal standing and working losses not to exceed the above PTE. Furthermore, TLO will maintain facility-wide emissions below the total emission threshold of the current permit.

4. REGULATORY REVIEW

This section addresses federal and state regulations that are applicable to the Terminal. Federal regulations addressed include the Title V permitting program as well as applicable New Source Performance Standards (NSPS) and National Emission Standards of Hazardous Air Pollutants (NESHAP) provisions. The Terminal is located at 1189 Tank Farm Road, at Section 7, Township 6 South, Range 34 East. This location is included in the Portneuf Valley maintenance area for particulate matter with aerodynamic diameter less than 10 micrometers (PM_{10}). The area in which the Terminal is located is in attainment with respect to all criteria air pollutants.

4.1. FEDERAL REGULATIONS

4.1.1. Prevention of Significant Deterioration

An emission source, located in attainment or unclassifiable areas, is subject to the Prevention of Significant Deterioration (PSD) permitting program if the new installation is either a major modification to an existing major source, or is a major source unto itself as outlined under IDAPA 58.01.01.205, which incorporates 40 CFR 52.21 by reference. The Terminal is not classified as a major source as defined by IDAPA 58.01.01.008. TLO is not currently proposing a modification to the Terminal. As a minor source under PSD, future PSD applicability will only be triggered if the proposed construction project would constitute a major stationary source by itself. In other words, the proposed modifications must increase emissions of a regulated air pollutant by more than the major source threshold to trigger PSD review. The PSD major source thresholds are either 100 tpy or 250 tpy of any criteria air pollutant, depending on the facility's SIC code. If the Terminal's storage capacity were to increase beyond 300,000 barrels, the facility would fall under the designation of "petroleum storage and transfer units with a total storage capacity exceeding 300,000 barrels" which is identified in 40 CFR 52.21(b)(1)(i)(a) as having a major source PSD threshold of 100 tpy. Since the Terminal's storage capacity is less than 300,000 barrels, the 250 tpy PSD major source threshold is used to determine PSD applicability.

4.1.2. Title V Operating Permits

IDEQ has the authority to issue Title V Operating permits (referred to as Tier I operating permits) under IDAPA 58.01.01.322. Title V applicability is discussed in Section 4.2.6 of this report.

4.1.3. New Source Performance Standards

IDAPA 58.01.01.107 adopts federal NSPS by reference. NSPS apply to certain types of equipment that are newly constructed, modified, or reconstructed after a given applicability date. NSPS applicability is reviewed below for each emission unit associated with the Terminal.

4.1.3.1. NSPS Subpart A

All affected sources subject to an NSPS are also subject to NSPS Subpart A, "General Provisions," unless specifically excluded by the source-specific NSPS. NSPS Subpart A requires the following of facilities subject to a source-specific NSPS:

- Initial construction/reconstruction notification
- Initial startup notification
- Performance tests
- Performance test date initial notification

- General monitoring requirements
- General recordkeeping requirements
- Semiannual monitoring system and/or excess emission reports

4.1.3.2. NSPS Subpart K

NSPS Subpart K, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After June 11, 1973, and Prior to May 19, 1978," applies to "each storage vessel for petroleum liquids which has a storage capacity greater than 151,412 liters (40,000 gallons)," if it:

- "Has a capacity greater than 151,416 liters (40,000 gallons), but not exceeding 246,052 liters (65,000 gallons), and commences construction or modification after March 8, 1974, and prior to May 19, 1978," or,
- "Has a capacity greater than 246,052 liters (65,000 gallons) and commences construction or modification after June 11, 1973, and prior to May 19, 1978."[8]

As shown in Table 2-1, all tanks at the Terminal are constructed or modified either prior to 1970 or later than 1993. Therefore, none of the Terminal's tanks are subject to NSPS Subpart K.

4.1.3.3. NSPS Subpart Ka

NSPS Subpart Ka, "Standards of Performance for Storage Vessels for Petroleum Liquids for Which Construction, Reconstruction, or Modification Commenced After May 18, 1978, and Prior to July 23, 1984," applies to "each storage vessel with a storage capacity greater than 151,416 liters (40,000 gallons) that is used to store petroleum liquids for which construction is commenced after May 18, 1978."[9] As shown in Table 2-1, all tanks at the Terminal are constructed or modified either prior to 1970 or later than 1993. Therefore, none of the Terminal's tanks are subject to NSPS Subpart Ka.

4.1.3.4. NSPS Subpart Kb

NSPS Subpart Kb, "Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984," applies to "each storage vessel with a capacity greater than or equal to 75 cubic meters (m^3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984."[10] Exemptions are provided for tanks between 75 and 151 m^3 storing liquid with maximum true vapor pressure less than 15.0 kPa (2.18 psi), and tanks greater than 151 m^3 storing liquid with maximum true vapor pressure less than 3.5 kPa (0.5 psi).[11]

- As shown in Table 2-1, Tanks 919, 920, 921, and 922 store unleaded gasoline, have a capacity greater than 75 m^3, and were constructed after 1984; as such, these tanks are subject to the requirements under NSPS Subpart Kb.

The following tanks are all not subject to NSPS Subpart Kb, for the following reasons:

---

[8] 40 CFR 60.110(a); (c)

[9] 40 CFR 60.110a(a)

[10] 40 CFR 60.110b(a)

[11] 40 CFR 60.110b(b)

- Tanks 914 and 915 store gasoline, Tank 916 stores denatured ethanol, and Tank 902 stores transmix. The maximum true vapor pressure of these mixtures is greater than 3.5 kPa. However, these tanks were constructed prior to 1984. Therefore, they are not subject to NSPS Subpart Kb.
- Tanks 901, 903, 905, 906, 907, 908, 911, 917, and 918 store diesel fuel, and Tank A100 stores fuel additive. The maximum true vapor pressure of diesel fuel is less than 3.5 kPa (0.5 psi), so these tanks are not subject to NSPS Subpart Kb. Furthermore, all of these tanks were constructed in 1963, except Tank A100, which was constructed in 1969. Therefore, these tanks are not subject to NSPS Subpart Kb.
- All of the Terminal's additive tanks except Tank A100 have capacities less than 75 m^3. Therefore, these tanks are not subject to NSPS Subpart Kb.

TLO has prepared the required IDEQ Federal Requirements Applicability (FRA) Form for NSPS Subpart Kb. Please refer to Appendix A for details on NSPS Subpart Kb emission standards, monitoring, reporting, and recordkeeping requirements for Tanks 919, 920, 921, and 922.

4.1.3.5. NSPS Subpart XX

NSPS Subpart XX, "Standards of Performance for Bulk Gasoline Terminals," applies to "the total of all the loading racks at a bulk gasoline terminal which deliver liquid product into gasoline tank trucks" for which construction, or modification is commenced after December 17, 1980, or reconstruction is commenced after August 18, 1983.[12] The loading rack was initially constructed in 1963 and has not been modified or reconstructed after December 17, 1980. As such, NSPS Subpart XX does not apply to the loading rack at the Terminal.[13]

4.1.4. National Emission Standards for Hazardous Air Pollutants

NESHAPs have been established in 40 CFR Part 61 and Part 63 to control emissions of Hazardous Air Pollutants (HAP) from stationary sources. The applicability of NESHAP rules often depends on a facility's major source status with respect to HAP emissions. Under 40 CFR Part 63, a major source is defined as "any stationary source or group of stationary sources located within a contiguous area and under common control that emits or has the potential to emit considering controls, in the aggregate, 10 tons per year or more of any HAP or 25 tons per year or more of any combination of HAP." The Terminal is considered an area source (not a major source) of HAP based on its PTE, as represented in Appendix C. The Terminal is not subject to any Part 61 NESHAPs.

4.1.4.1. NESHAP Subpart R

40 CFR 63, Subpart R, "National Emission Standards for Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout Stations)," applies to owners and operators of bulk gasoline terminals that are major sources of HAP and that are not exempt based on the equation given at 40 CFR Part 63. The Terminal is currently subject to NESHAP Subpart R, pursuant to an EPA determination in September 9, 2000.[14] The standards in NESHAP Subpart R apply to each loading rack and storage vessel at the affected source, as well as all equipment components in gasoline service.

---

[12] 40 CFR 60.500(c): "Reconstructions after December 17, 1980 that were commenced before August 18, 1982 in order to comply with any emission standard adopted by a State or political subdivision thereof will not be considered a reconstruction under the provisions of 40 CFR 60.15."

[13] 40 CFR 60.14(e)(5) specifically states that the addition of a device whose primary function is the reduction of air pollutants is not considered a modification under NSPS. As such, the installation of the VCU at the Terminal in 1997 does not constitute a modification under NSPS Subpart XX.

[14] EPA letter dated February 4, 2000 (http://cfpub.epa.gov/adi/pdf/adi-mact-m030024.pdf, accessed 09/13/2013), determined that the Pocatello terminal is subject to requirements under NESHAP Subpart R via EPA's "Once In, Always In" policy with respect to NESHAP. The terminal is currently not a major source of HAP.

NESHAP Subpart R requires each storage vessel in gasoline service with a capacity of greater than 75 m^3 to comply with applicable provisions under NSPS Subpart Kb. These provisions include tank controls as described under 40 CFR 60.112b(a)(1) through (4). As shown in Table 2-1, all tanks in gasoline service are equipped with internal floating roofs (IFRs) thereby meeting the requirements of NESHAP Subpart R.

NESHAP Subpart R requires that the loading rack, which loads gasoline, meet an emission standard of 10 mg of total organic compounds (TOC) per liter of gasoline loaded. NESHAP Subpart R also requires monthly leak inspections of all equipment in gasoline service.

TLO has prepared the required IDEQ FRA Form for NESHAP Subpart R, including the applicable requirements as referenced by NESHAP Subpart R under NSPS Subparts Kb and XX. Please refer to Appendix A for details on NESHAP Subpart R emission standards, monitoring, reporting, and recordkeeping requirements for the Terminal.

4.1.4.2. NESHAP Subpart BBBBBB

NESHAP Subpart BBBBBB, "National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Distribution Bulk Terminals, Bulk Plants, and Pipeline Facilities," applies to each "bulk gasoline terminal that is not subject to the control requirements of 40 CFR part 63, subpart R … ," per 40 CFR 63.11081(a)(1). As described in Section 4.1.4.1, the Terminal is currently subject to the requirements of NESHAP Subpart R; as such, the Terminal is not subject to requirements under NESHAP Subpart BBBBBB.

4.2. IDEQ REGULATIONS

4.2.1. Certification of Documents

IDAPA 58.01.01.123 requires that all documents the applicant submits to the IDEQ will contain a certification by a responsible official. "The certification shall state that, based on information and belief formed after reasonable inquiry, the statements and information in the document are true, accurate, and complete." An appropriate certification statement from a responsible official is included on the Form GI in Appendix A.

4.2.2. Circumvention

IDAPA 58.01.01.155 states "No person shall willfully cause or permit the installation or use of any device or use of any means that conceals emissions of pollutants that would otherwise violate the provisions of this chapter without resulting in a reduction in the total amount of emissions." TLO will not conceal emissions of pollutants.

4.2.3. Permit to Construct

In accordance with IDAPA 58.01.01.201, a PTC as outlined under subsections 200 through 228 is required for "construction or modification of any stationary source, facility, major facility, or major modification." This application does not represent construction or modification. It represents a facility currently operating under a Tier II operating permit. Pursuant to communication with IDEQ, the Terminal has elected to apply for a PTC instead of a Tier II renewal operating permit.[15] Therefore, the requirements of a PTC application apply to this application.

[15] Conference call with Bill Rogers, IDEQ, on August 6, 2013.

Required information under a PTC application is listed under IDAPA 58.01.01.202.01. For new or modified stationary sources, site information and drawings, emission estimates, and a description of operation must be included in the permit application. Information on the site and operation are provided in Section 2, while emission calculations are provided in Section 3 of this application. As described in Section 3, the Terminal is not applying to increase the facility emission cap; therefore, this project does not trigger review for TAP emissions under Sections 585 and 586 of IDAPA 58.01.01. Modeling of criteria pollutant impacts is not required for this PTC application, as discussed in the correspondence provided in Appendix F.

Section 224 (PTC Application Fee) and Section 225 (PTC Processing Fee) apply to this PTC application. TLO submitted the $1,000 application fee required by IDAPA 58.01.01.224 during the original submittal of the PTC application for the Terminal on March 31, 2014. Appendix G contains correspondence with IDEQ that states that the previous PTC application fee is applicable to the new PTC application. Additional processing fees will be submitted as requested by IDEQ.

4.2.4. Toxic Air Pollutant Compliance

IDAPA §210, which is entitled "Demonstration of Preconstruction Compliance with Toxic Standards," establishes procedures for PTC applications to demonstrate that TAP emissions from the project would not injure or unreasonably affect human or animal life or vegetation. Uncontrolled short-term TAP emissions subject to review in this PTC application are calculated and presented in Table C-23a of Appendix C. The VCU at the Pocatello Terminal has not gone through a PTC process in the past; therefore, the project emission increase from the VCU is calculated as if the VCU were a new unit (no emissions treated as existing).

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:

- The uncontrolled emission rate of the pollutant is below the screening EL promulgated by IDEQ at §§ 585-86 (§210.05).
- 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).
- The controlled emission rate of the pollutant is below the screening EL promulgated by IDEQ at §§ 585-86, <u>and</u> the uncontrolled ambient concentration of the pollutant, determined by a modeling analysis, is below the AAC promulgated by IDEQ at §§ 585-86 (§210.07).
- 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.
- 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).

4.2.4.1. TAPs Other than Benzene and Naphthalene

As shown in Table C-17b of the emission calculations in Appendix C, the uncontrolled emission rates of every TAP (maximum uncontrolled emissions on a short-term basis), with the exceptions of benzene and naphthalene, are less than the corresponding screening ELs established by IDAPA §§ 585 and 586.[16] Each TAP of which the project emission increase is below the applicable TAP screening EL is in compliance with IDEQ's TAP standards.

[16] As shown in Table C-17b of Appendix C, the uncontrolled emission rate is calculated by assuming no control from the VCU. Based on the calculation results: the conclusions here concerning which pollutants exceed or meet the screening ELs do not depend on whether the VCU is assumed to be operating or not operating.

4.2.4.2. Benzene and Naphthalene – Emissions Subject to Federal Regulation

Uncontrolled emissions of benzene and naphthalene exceed their screening ELs. Uncontrolled emissions of naphthalene do not exceed the naphthalene screening EL in IDAPA §585, but they do exceed the screening EL for PAH in IDAPA §586. The emission points in this project that emit benzene and naphthalene may be divided into two categories:

1. Those emission points that are subject to NSPS and NESHAP regulations that control benzene and naphthalene;
2. Those that are not subject to NSPS or NESHAP regulations.

NESHAP Subpart R regulates benzene and naphthalene emissions from gasoline storage tanks, equipment in gasoline service, and gasoline loading operations (including vapor control units such as the VCU), as discussed in Section 4.1.4.1. [17] The following emission points at the Pocatello Terminal are subject to control requirements under NESHAP Subpart R:

- Product loading rack operations controlled by the VCU;
- Stack emissions from the VCU;
- Fugitive equipment leaks from equipment in gasoline service;[18]
- Gasoline storage tanks.[19]

This project includes a PTC permit review of the VCU. Loading rack and VCU emissions of benzene and naphthalene from gasoline loading are in compliance with the IDEQ TAP program as codified at IDAPA §210.20:

20. *"NSPS and NESHAP Sources.*
    a. *"If the owner or operator demonstrates that 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, no further procedures for demonstrating preconstruction compliance will be required under Section 210 for that toxic air pollutant as part of the application process.*
    b. *"If the owner or operator demonstrates that the toxic air pollutant from the source or modification is regulated by the EPA at the time of permit issuance under 40 CFR Part 60, 40 CFR Part 61 or 40 CFR Part 63 and the permit to construct issued by the Department contains adequate provisions implementing the federal standard, no further procedures for demonstrating preconstruction compliance will be required under Section 210 for that toxic air pollutant as part of the application process."* [20]

Emissions from the product loading rack and VCU are regulated under NESHAP Subpart R, as this NESHAP was promulgated for the specific purpose of controlling emissions of organic HAP, including benzene and naphthalene. The NESHAP regulates emissions from the loading rack by requiring the use of a vapor collection

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[17] As established in Tables C-2 and C-3 of the emission calculations in Appendix C, the Pocatello Terminal is a minor source with respect to HAP, emitting less than 25 tpy of total HAP and less than 10 tpy of each HAP.

[18] NESHAP Subpart R regulates fugitive leaks from equipment in gasoline service. That said, no additional equipment in gasoline service is constructed, modified, or otherwise subject to PTC review in this project. New fugitive equipment in this project is associated with jet fuel storage and filtration equipment, and with diesel and jet loading operations at the product loading rack. This application must demonstrate that emissions from these sources do comply with the TAP program.

[19] NESHAP Subpart R regulates fugitive leaks from storage tanks in gasoline service. That said, no gasoline storage tanks are constructed, modified, or otherwise subject to PTC review in this project.

[20] IDAPA §210.20

system that routes vapors to a control device, and the NESHAP regulates emissions from the control device by specifying an emission standard of 10 mg or less of total organic compound (TOC) emissions per liter of gasoline loaded.[21] Furthermore, the NESHAP references 40 CFR 60.502(e)(5), which requires that the trucks loaded at the facility be certified for vapor tightness.[22]

Several citations in the preamble to the proposed NESHAP Subpart R rulemaking confirm that benzene and naphthalene are directly regulated under the NESHAP:[23]

> *"The HAP list presented in the Act section 112(b), as amended in 1990, contains additional compounds normally contained in gasoline vapor, including, but not limited to benzene, toluene, hexane, ethylbenzene, naphthalene, cumene, xylenes, n-hexane, 2,2,4-trimethylpentane, and methyl tert-butyl ether (MTBE). Additionally, new provisions on how to develop NESHAP were provided in the 1990 amendments to the Act. Therefore, it became necessary to reevaluate emissions from gasoline distribution facilities to consider a combination of HAP's and the new provisions for setting NESHAPs."* (II. Background)
>
> *"The gasoline distribution facility category is made up of several facility types, which taken together form the gasoline distribution network. The pollutants emitted at each of the facilities in the gasoline distribution network are essentially the same. These emissions consist of a mixture of organic compounds (essentially all of which qualify as VOC under the Agency's definition). Section 112(b) of the Act contains a list of HAP's for which the Agency has been directed to set national emission standards. A comparison of profiles of normal gasoline vapors to the HAP list reveals several compounds common to both. Benzene, toluene, hexane, ethylbenzene, naphthalene, cumene, all three chemical orientations of xylene (para, meta, and ortho), n-hexane, and 2,2,4-trimethylpentane (iso-octane) appear on both lists."* (VI. Selection Rationale)
>
> *"Section 211 of the Act contains provisions that will affect gasoline composition in the 1998 base year and, therefore, the HAP emissions from gasoline distribution sources. This section of the Act requires that fuels purchased and sold in nonattainment areas contain higher levels of oxygenates (reformulated and oxygenated fuel programs). While the focus of these fuels programs is the reduction of both tailpipe (combustion) and evaporative emissions of CO and air toxics (benzene, 1,3-butadiene, formaldehyde, acetaldehyde, and POM) emissions from gasoline vehicles, the intent of today's proposed rule is to reduce major stationary source evaporative HAP emissions from gasoline distribution facilities. Methyl tert-butyl ether (MTBE) is projected to be a major source of oxygen that will be added to gasoline to meet the oxygenate content requirements for the reformulated gasoline and oxygenated fuels programs. MTBE is also listed in Section 112(b) as a HAP."* (VI. Selection Rationale)

Based on these statements, it is clear that benzene and naphthalene are "regulated…at the time of permit issuance under 40 CFR Part 60, 40 CFR Part 61 or 40 CFR Part 63."[24] As identified in Table C-10a of Appendix C, gasoline emissions constitute the majority of benzene, naphthalene, and general organic HAP emissions emitted from the loading rack and VCU.

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[21] 40 CFR 63.422(b)

[22] 40 CFR 63.422(c)

[23] "National Emission Standards for Hazardous Air Pollutants for Source Category: Gasoline Distribution (Stage I), Proposed Rule, February 8, 2008, accessed online at https://www3.epa.gov/ttn/atw/gasdist/fr08fe94.pdf.

[24] IDAPA §210.20

The loading rack and VCU are subject to, and in continuous compliance with, the emission standards of NESHAP Subpart R. These emission standards are reflected directly in the site's current Tier II operating permit.[25]

On that basis, per IDAPA §210.20.b, "no further procedures for demonstrating preconstruction compliance will be required under Section 210 for…" benzene and naphthalene "…as part of the application process."

4.2.4.3. Benzene and Naphthalene – Emissions Not Subject to Federal Regulation

In this application, the following emission points do emit benzene or naphthalene emissions, but they are subject to control requirements under NESHAP Subpart R:

- Transmix loading operation not controlled by the VCU
- New fugitive equipment leaks, from equipment that is not in gasoline service
- Modified storage tanks that are not in gasoline service

The transmix loading operation emits benzene and naphthalene. The new fugitive equipment leaks and modified storage tanks emit naphthalene. These emissions of benzene and naphthalene are subject to review under the TAP program.

Compliance for these emissions is demonstrated by performing air dispersion modeling of the TAP associated with the product loading rack and the VCU, after calculating emission rates using the potential throughputs described in Section 3.2. Ambient concentrations of the TAP comply with the AACs of IDAPA §§ 585-86. This dispersion modeling analysis is presented in Section 5. As shown in that section, the emissions of benzene and naphthalene are shown to be in compliance with the respective AACs for those pollutants.

Therefore, all emissions of TAP are in compliance with the preconstruction requirements of IDAPA §210.

4.2.5. Prevention of Significant Deterioration

IDAPA 58.01.01.205 incorporates the PSD requirements of 40 CFR 52.21 by reference, which are discussed in Section 4.1.1 of this report.

4.2.6. Tier I Operating Permits

According to IDAPA 58.01.01.301.01, "No owner or operator shall operate, or allow or tolerate the operation of, any Tier I source without an effective Tier I operating permit." A Tier I source is defined as any of the following:

> *a. Any source located at any major facility as defined in Section 008;*
> *b. Any source, including an area source, subject to a standard, limitation, or other requirement under 42 U.S.C. Section 7411 or 40 CFR Part 60, and required by EPA to obtain a Part 70 permit;*
> *c. Any source, including an area source, subject to a standard or other requirement under 42 U.S.C. Section 7412, 40 CFR Part 61 or 40 CFR Part 63, and required by EPA to obtain a Part 70 permit, except that a source is not required to obtain a permit solely because it is subject to requirements under 42 U.S.C. Section 7412(r);*
> *d. Any Phase II source; and*
> *e. Any source in a source category designated by the Department.*[26]

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[25] See the site's current Tier II permit, No. T2-2008.0026, issued September 9, 2008, pp. 9-19.

[26] IDAPA 58.01.01.006.120

The Terminal is not a major facility as defined in Section 008. As of 2003, the Terminal has operated as a synthetic minor source of VOC under limits set forth in Appendix A of the Terminal's Tier II operating permit. The Terminal's HAP PTE is less than 10 tpy of any single HAP and less than 25 tons per year of total HAP. The Terminal's PTE does not exceed 100 tons per year of any regulated air pollutant. The Terminal is not subject to a requirement to obtain a Part 70 permit by EPA. The Terminal is not a Phase II source under the Acid Rain Program and it is not in a source category designated by the Department. The Terminal is therefore not a Tier I source and is not subject to the requirement to apply for a Tier I operating permit.

4.2.7. Tier II Operating Permit Program

The Terminal currently holds a Tier II operating permit. This Tier II operating permit was issued pursuant to IDAPA 58.01.01.400 through 410. The Tier II operating permit was originally issued in 2003 to establish synthetic minor limits on emissions and throughput such that the Terminal could operate as a synthetic minor source with respect to the Tier I operating permit program. The Terminal is not required by any of the provisions of IDAPA 58.01.01.401 to operate under a Tier II operating permit.

4.2.8. Industrial Flares

IDAPA 58.01.01.610 stipulates that industrial flare are allowable forms of open burning. The VCU at the Terminal is an enclosed combustion unit and is not an open burning activity as defined at IDAPA 58.01.01.006.78: "The burning of any matter in such a manner that the products of combustion resulting from the burning are emitted directly into the ambient air without passing through a stack, duct or chimney."

4.2.9. Visible Emissions

IDAPA 58.01.01.625 prohibits the discharge of opacity greater than 20 percent into the atmosphere from any emission unit for a period or periods aggregating more than three minutes in any sixty minute period. TLO will comply with this standard by operating and maintaining the equipment covered by this application appropriately. In addition, TLO will not allow fugitive emissions to be observed leaving the property boundary for a period of more than three minutes in any hour.

4.2.10. Sulfur Content of Fuels

TLO will comply with the sulfur content standards set forth in this section. Per Section 725.03 (Distillate Fuel Oil), the Terminal will not sell, distribute, use or make available for use, any distillate fuel oil containing more than 0.3 % by weight of sulfur for ASTM Grade 1 fuel oil or more than 0.5 % by weight of sulfur for ASTM Grade 2 fuel oil.

4.2.11. Control of Odors

IDAPA 58.01.01.776 prohibits sources from causing or permitting "the emission of odorous gases, liquids or solids into the atmosphere in such quantities as to cause air pollution." The Terminal will not cause the emission of any new odorous emissions, and TLO does not currently emit odors that could be deemed as air pollution from any sources at their facility.

5. MODELING ANALYSIS

Modeling analyses were conducted using AERMOD to evaluate the impact of NO_2 against the 1-hour and annual NAAQS and the impacts of benzene and naphthalene with respect to IDAPA AAC levels. The model protocol for these analyses was submitted to IDEQ on February 26, 2016 and received approval on March 18, 2016. The original protocol that was submitted and approved can be found in Appendix H. It describes the model setup, applicable standards, and preliminary results from the modeling analyses. Appendix I contains the revised protocol with final model results, and results plots overlaid on aerial imagery. The final results of the modeling analyses are summarized in Table 5-1 and Table 5-2 below. Detailed results tables can be found in Appendix J.

Table 5-1. Results for Cumulative NAAQS Impact Analyses

Pollutant	Averaging Period	Modeled Design Concentration[a] (µg/m³)	Background Concentration (µg/m³)	Total Impact (µg/m³)	NAAQS (µg/m³)
NO_2	1-hour	32.59	33.84	66.43	188
	Annual	2.68	7.33	10.01	100

[a] An ARM ratio of 0.75 is applied to 1-hour results, and a ratio of 0.8 is applied to annual results.

Table 5-2. Results for TAP Impact Analyses

TAP	Averaging Period	Maximum Modeled Impact (µg/m³)	AAC or AACC (µg/m³)
Benzene	Annual	3.04×10^{-3}	0.12
Naphthalene (As PAC)	Annual	3.40×10^{-4}	0.014

APPENDIX A: IDEQ APPLICATION FORMS

APPENDIX B: SITE PLAN

APPENDIX C: POTENTIAL EMISSION CALCULATIONS

APPENDIX D: TANK EMISSION CALCULATIONS

APPENDIX E: SAFETY DATA SHEETS

APPENDIX F: VCU SOURCE TEST REPORT

APPENDIX G: CORRESPONDENCE WITH IDEQ

APPENDIX H: MODEL PROTOCOL

APPENDIX I: MODEL REPORT

APPENDIX J: MODEL RESULTS TABLES

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Cover Sheet for Air Permit Application – Permit to Construct Form CSPTC

Please see instructions on page 2 before filling out the form.

COMPANY NAME, FACILITY NAME, AND FACILITY ID NUMBER			
1. Company Name	Tesoro Logistics Operations LLC		
2. Facility Name	Pocatello Terminal	3. Facility ID No.	077-00023
4. Brief Project Description - One sentence or less	PTC Application to Convert 2008 Tier II Operating Permit		

PERMIT APPLICATION TYPE

5. ☐ New Source ☒ New Source at Existing Facility ☐ PTC for a Tier I Source Processed Pursuant to IDAPA 58.01.01.209.05.c
☐ Unpermitted Existing Source ☐ Facility Emissions Cap ☐ Modify Existing Source: Permit No.: T2-2008.0026 Date Issued: 9/9/2008
☐ Required by Enforcement Action: Case No.: _____

6. ☒ Minor PTC ☐ Major PTC

FORMS INCLUDED

Included	N/A	Forms	DEQ Verify
☒	☐	Form CSPTC – Cover Sheet	☐
☒	☐	Form GI – Facility Information	☐
☒	☐	Form EU0 – Emissions Units General	☐
☐	☒	Form EU1– Industrial Engine Information Please specify number of EU1s attached: _____	☐
☐	☒	Form EU2– Nonmetallic Mineral Processing Plants Please specify number of EU2s attached: _____	☐
☐	☒	Form EU3– Spray Paint Booth Information Please specify number of EU3s attached: _____	☐
☐	☒	Form EU4– Cooling Tower Information Please specify number of EU3s attached: _____	☐
☐	☒	Form EU5 – Boiler Information Please specify number of EU4s attached: _____	☐
☐	☒	Form CBP– Concrete Batch Plant Please specify number of CBPs attached: _____	☐
☐	☒	Form HMAP – Hot Mix Asphalt Plant Please specify number of HMAPs attached: _____	☐
☐	☒	PERF – Portable Equipment Relocation Form	☐
☐	☒	Form AO – Afterburner/Oxidizer	☐
☐	☒	Form CA – Carbon Adsorber	☐
☐	☒	Form CYS – Cyclone Separator	☐
☐	☒	Form ESP – Electrostatic Precipitator	☐
☐	☒	Form BCE– Baghouses Control Equipment	☐
☐	☒	Form SCE– Scrubbers Control Equipment	☐
☐	☒	Form VSCE – Venturi Scrubber Control Equipment	☐
☐	☒	Form CAM – Compliance Assurance Monitoring	☐
☒	☐	Forms EI-– Emissions Inventory	☐
☒	☐	PP – Plot Plan	☐
☐	☒	Forms MI1 – MI4 – Modeling (Excel workbook, all 4 worksheets)	☐
☒	☐	Form FRA – Federal Regulation Applicability	☐

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For assistance, call the
Air Permit Hotline: 1-877-5PERMIT

General Information **Form GI**
Revision 7
6/29/12

Please see instructions on back page before filling out the form. All information is required. If information is missing, the application will not be processed.

Identification

1. Facility name: Tesoro Logistics Operations LLC

2. Existing facility identification number: 077-00023

☐ **Check if new facility (not yet operating)**

3. Brief project description: PTC Application to Convert 2008 Tier II Operating Permit

Facility Information

4. Primary facility permitting contact name: Kirt Rhoads
Contact type: Facility permitting contact
Telephone number: 801-606-2169
E-mail: kirt.w.rhoads@tsocorp.com

5. Alternate facility permitting contact name: Peter Hendricks
Alternate contact type: Facility permitting contact
Telephone number: 801-521-4971
E-mail: peter.m.hendricks@tsocorp.com

6. Mailing address where permit will be sent (street/city/county/state/zip code): 475 West 900 North, Salt Lake City, Utah 84103

7. Physical address of permitted facility (if different than mailing address) (street/city/county/state/zip code): 1189 Tank Farm Road, Pocatello, ID 83204

8. Is the equipment portable? ☐ Yes* ☒ No *If yes, complete and attach PERF; see instructions.

9. NAICS codes: Primary NAICS: 424710
Secondary NAICS:

10. Brief business description and principal product produced: Petroleum product transportation and distribution facility

11. Identify any adjacent or contiguous facility this company owns and/or operates: N/A

12. Specify type of application ☒ **Permit to construct (PTC); application fee of $1,000 required. See instructions.**

☐ **Tier I permit** ☐ **Tier II permit** ☐ **Tier II/Permit to construct**

For Tier I permitted facilities only: If you are applying for a PTC then you must also specify how the PTC will be incorporated into the Tier I permit.

☐ **Co-process Tier I modification and PTC** ☐ **Incorporate PTC at the time of Tier I renewal** ☐ **Administratively amend the Tier I permit to incorporate the PTC upon applicant's request (IDAPA 58.01.01.209.05.a, b, or c)**

Certification

In accordance with IDAPA 58.01.01.123 (Rules for the Control of Air Pollution in Idaho), I certify based on information and belief formed after reasonable inquiry, the statements and information in the document(s) are true, accurate, and complete.

13. Responsible official's name: John Roark
Official's title: Vice President, Mid-Continent Logistics Opeartions
Official's address: 19100 Ridgewood Parkway, San Antonio, TX 78259
Telephone number: 210-626-4373
E-mail: john.a.roark@tsocorp.com
Official's signature: John Roark
Date: 4-4-2014

☒ **14. Check here to indicate that you want to review the draft permit before final issuance.**

DEQ AIR QUALITY PROGRAM
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For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Emissions Unit - General **Form EU0**
Revision 4
08/28/08

Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 901
6.	EU ID Number:	TANK 901
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, FIXED ROOF
10..	Maximum Capacity:	369,600 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Emissions Unit - General **Form EU0**
Revision 4
08/28/08

Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 902
6.	EU ID Number:	TANK 902
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, INTERNAL FLOATING ROOF
10..	Maximum Capacity:	324,324 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 903
6.	EU ID Number:	TANK 903
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, FIXED ROOF
10..	Maximum Capacity:	380,772 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

DEQ AIR QUALITY PROGRAM
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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 905
6.	EU ID Number:	TANK 905
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, FIXED ROOF
10..	Maximum Capacity:	376,782 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 906
6.	EU ID Number:	TANK 906
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, FIXED ROOF
10..	Maximum Capacity:	379,176 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 907
6.	EU ID Number:	TANK 907
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, INTERNAL FLOATING ROOF
10..	Maximum Capacity:	360,864 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 908
6.	EU ID Number:	TANK 908
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, FIXED ROOF
10..	Maximum Capacity:	376,614 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 911
6.	EU ID Number:	TANK 911
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, INTERNAL FLOATING ROOF
10..	Maximum Capacity:	796,908 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 914
6.	EU ID Number:	TANK 914
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, INTERNAL FLOATING ROOF
10..	Maximum Capacity:	567,462 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 915
6.	EU ID Number:	TANK 915
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, INTERNAL FLOATING ROOF
10..	Maximum Capacity:	378,168 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 916
6.	EU ID Number:	TANK 916
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, INTERNAL FLOATING ROOF
10..	Maximum Capacity:	669,522 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 917
6.	EU ID Number:	TANK 917
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, FIXED ROOF
10..	Maximum Capacity:	798,294 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 918
6.	EU ID Number:	TANK 918
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, INTERNAL FLOATING ROOF
10..	Maximum Capacity:	807,072 GALLONS
11.	Date of Construction:	1969
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 919
6.	EU ID Number:	TANK 919
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, INTERNAL FLOATING ROOF
10..	Maximum Capacity:	764,106 GALLONS
11.	Date of Construction:	1994
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 920
6.	EU ID Number:	TANK 920
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, INTERNAL FLOATING ROOF
10..	Maximum Capacity:	745,206 GALLONS
11.	Date of Construction:	1995
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 921
6.	EU ID Number:	TANK 921
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, INTERNAL FLOATING ROOF
10..	Maximum Capacity:	1,950,060 GALLONS
11.	Date of Construction:	2002
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK 922
6.	EU ID Number:	TANK 922
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, INTERNAL FLOATING ROOF
10..	Maximum Capacity:	1,944,558 GALLONS
11.	Date of Construction:	2002
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK A100
6.	EU ID Number:	TANK A100
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, VERTICLE FIXED ROOF TANK
10..	Maximum Capacity:	21,000 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK A101
6.	EU ID Number:	TANK A101
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, HORIZONTAL TANK
10..	Maximum Capacity:	6,000 GALLONS
11.	Date of Construction:	1963
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK A102
6.	EU ID Number:	TANK A102
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, HORIZONTAL TANK
10..	Maximum Capacity:	4,000 GALLONS
11.	Date of Construction:	1990
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK A105
6.	EU ID Number:	TANK A105
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, HORIZONTAL TANK
10..	Maximum Capacity:	2,000 GALLONS
11.	Date of Construction:	1990
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK A108
6.	EU ID Number:	TANK A108
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, HORIZONTAL TANK
10..	Maximum Capacity:	7,500 GALLONS
11.	Date of Construction:	1990
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK A110
6.	EU ID Number:	TANK A110
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, HORIZONTAL TANK
10..	Maximum Capacity:	4,000 GALLONS
11.	Date of Construction:	1995
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Emissions Unit - General **Form EU0**
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IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK A112
6.	EU ID Number:	TANK A112
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, HORIZONTAL TANK
10..	Maximum Capacity:	6,500 GALLONS
11.	Date of Construction:	DEC 2004
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

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Air Permit Hotline – 1-877-5PERMIT

Emissions Unit - General **Form EU0**
Revision 4
08/28/08

Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK A113
6.	EU ID Number:	TANK A113
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, HORIZONTAL TANK
10..	Maximum Capacity:	7,800 GALLONS
11.	Date of Construction:	DEC 2004
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

DEQ AIR QUALITY PROGRAM
1410 N. Hilton, Boise, ID 83706
For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Emissions Unit - General **Form EU0**
Revision 4
08/28/08

Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TANK A114
6.	EU ID Number:	TANK A114
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	CUSTOM DESIGNED
9.	Model:	CUSTOM DESIGNED, HORIZONTAL TANK
10..	Maximum Capacity:	1,600 GALLONS
11.	Date of Construction:	FEB 2007
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☒ No ☐ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:			
15. Date of Installation:		16. Date of Modification (if any):	
17. Manufacturer and Model Number:			
18. ID(s) of Emission Unit Controlled:			
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☐ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☐ Yes ☐ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency						

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency.

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	8,760 HOURS/YEAR
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☐ Yes ☒ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☐ Material Usage Limit(s):	
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	

DEQ AIR QUALITY PROGRAM
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For assistance, call the
Air Permit Hotline – 1-877-5PERMIT

Emissions Unit - General **Form EU0**
Revision 4
08/28/08

Please see instructions on page 2 before filling out the form.

IDENTIFICATION

1. Company Name:	2. Facility Name:	3. Facility ID No:
Tesoro Logistics Operations LLC	Pocatello Terminal	077-00023

4. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

EMISSIONS UNIT (PROCESS) IDENTIFICATION & DESCRIPTION

5.	Emissions Unit (EU) Name:	TRUCK LOADING RACK
6.	EU ID Number:	TRUCK LOADING RACK
7.	EU Type:	☐ New Source ☐ Unpermitted Existing Source ☐ Modification to a Permitted Source -- Previous Permit #: Date Issued:
8.	Manufacturer:	LOADING TYPE: BOTTOM LOADING - BALANCED SERVICE
9.	Model:	LOADING ARM VAPOR CLOSURE: CHICKSAN
10..	Maximum Capacity:	FACILITY THROUGHPUT LIMITS
11.	Date of Construction:	1969
12.	Date of Modification (if any):	
13.	Is this a Controlled Emission Unit?	☐ No ☒ Yes If Yes, complete the following section. If No, go to line 22.

EMISSIONS CONTROL EQUIPMENT

14. Control Equipment Name and ID:	Vapor Combustion Unit, VCU Flare		
15. Date of Installation:	DEC 1997	16. Date of Modification (if any):	
17. Manufacturer and Model Number:	JOHN ZINK CO. ZCT-2-8-35-X-2/8-X-X		
18. ID(s) of Emission Unit Controlled:	Truck Loading Rack		
19. Is operating schedule different than emission units(s) involved?	☐ Yes ☒ No		
20. Does the manufacturer guarantee the control efficiency of the control equipment?	☒ Yes ☒ No (If Yes, attach and label manufacturer guarantee)		

	Pollutant Controlled					
	PM	PM10	SO_2	NOx	VOC	CO
Control Efficiency				<4 mg/L	98%	<10 mg/L

21. If manufacturer's data is not available, attach a separate sheet of paper to provide the control equipment design specifications and performance data to support the above mentioned control efficiency. SOURCE TEST REPORT IS ATTACHED

EMISSION UNIT OPERATING SCHEDULE (hours/day, hours/year, or other)

22.	Actual Operation:	AS NEEDED
23.	Maximum Operation:	8,760 HOURS/YEAR

REQUESTED LIMITS

24.	Are you requesting any permit limits?	☒ Yes ☐ No (If Yes, indicate all that apply below)
	☐ Operation Hour Limit(s):	
	☐ Production Limit(s):	
	☒ Material Usage Limit(s):	FACILITY THROUGHPUT LIMITS (SEE REPORT SECTION 3)
	☐ Limits Based on Stack Testing:	Please attach all relevant stack testing summary reports
	☐ Other:	
25.	Rationale for Requesting the Limit(s):	LIMIT FACILITY THROUGHPUT FOR SYNTHETIC MINOR STATUS

DEQ AIR QUALITY PROGRAM
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AIR PERMIT APPLICATION

Revision 6
10/7/09

For each box in the table below, CTRL+click on the blue underlined text for instructions and information.

IDENTIFICATION	
1. Company Name:	2. Facility Name:
Tesoro Logistics Operations LLC	Pocatello Terminal 077-00023
3. Brief Project Description:	PTC Application to Convert 2008 Tier II Operating Permit

APPLICABILITY DETERMINATION	
4. List applicable subparts of the New Source Performance Standards (NSPS) (40 CFR part 60). Examples of NSPS affected emissions units include internal combustion engines, boilers, turbines, etc. The applicant must thoroughly review the list of affected emissions units.	List of applicable subpart(s): ***Part 60 Subpart Kb (Provisions Referenced)*** ***Part 60 Subpart XX (Provisions Referenced)*** ☐ Not Applicable
5. List applicable subpart(s) of the National Emission Standards for Hazardous Air Pollutants (NESHAP) found in 40 CFR part 61 and 40 CFR part 63. Examples of affected emission units include solvent cleaning operations, industrial cooling towers, paint stripping and miscellaneous surface coating. EPA has a web page dedicated to NESHAP that should be useful to applicants.	List of applicable subpart(s): ***Part 63 Subpart R (References Provisions of Part 60 Subparts Kb and XX)*** ☐ Not Applicable
6. For each subpart identified above, conduct a complete a regulatory analysis using the instructions and referencing the example provided on the following pages. **Note** - Regulatory reviews must be submitted with sufficient detail so that DEQ can verify applicability and document in legal terms why the regulation applies. Regulatory reviews that are submitted with insufficient detail will be determined incomplete.	☑ A detailed regulatory review is provided (Follow instructions and example). ☐ DEQ has already been provided a detailed regulatory review. Give a reference to the document including the date.

IF YOU ARE UNSURE HOW TO ANSWER ANY OF THESE QUESTIONS, CALL THE AIR PERMIT HOTLINE AT 1-877-5PERMIT

It is emphasized that it is the applicant's responsibility to satisfy all technical and regulatory requirements, and that DEQ will help the applicant understand what those requirements are prior to the application being submitted but that DEQ will not perform the required technical or regulatory analysis on the applicant's behalf.

Yellow highlighted text indicates sections that are applicable to the Terminal.

Bold and Italic text notes TLO comments.

SUBPART Kb—Standards of Performance for Volatile Organic Liquid Storage Vessels (Including Petroleum Liquid Storage Vessels) for Which Construction, Reconstruction, or Modification Commenced After July 23, 1984

Source Notes

Source: 42 U.S.C. 7401–7601.

This review is performed with the awareness that the Terminal is subject to requirements under NESHAP Subpart R. As a result, gasoline storage tanks at the terminal with a design capacity greater than 75 m^3 are subject to specific requirements called from NSPS Subpart Kb. Tanks 919, 920, 921, and 922 are currently subject to Kb in their own right, while all gasoline storage vessels not otherwise subject to Kb must comply with the specific requirements indicated by NESHAP R.

As currently constructed, the Terminal operates several gasoline storage tanks with capacities greater than 75 m^3. Each of these storage tanks operates with an internal floating roof (IFR) that meets the requirements of this subpart. There are several fixed roof tanks larger than 75 m^3, but they do not currently store gasoline.

§ 60.110b Applicability and designation of affected facility.

60.110b(a)

Except as provided in paragraph (b) of this section, the affected facility to which this subpart applies is each storage vessel with a capacity greater than or equal to 75 cubic meters (m^3) that is used to store volatile organic liquids (VOL) for which construction, reconstruction, or modification is commenced after July 23, 1984.

60.110b(b)

This subpart does not apply to storage vessels with a capacity greater than or equal to 151 m^3 storing a liquid with a maximum true vapor pressure less than 3.5 kilopascals (kPa) or with a capacity greater than or equal to 75 m^3 but less than 151 m^3 storing a liquid with a maximum true vapor pressure less than 15.0 kPa.

TLO acknowledges the applicability of Subpart Kb directly to tanks that meet the above criteria. However, NESHAP Subpart R contains specific overlap provisions that apply to the Terminal. The overlap provision at 40 CFR 63.423(a) states that all gasoline storage tanks at a facility subject to NESHAP Subpart R are required to comply with the control requirements of NSPS Subpart Kb (except §60.112b(a)(1)(iv) through (ix) and §60.112b(a)(2)(ii)). Therefore, regardless of applicability to individual tanks, all tanks that store gasoline are subject to certain control requirements in this subpart.

60.110b(c)

[Reserved]

60.110b(d)

This subpart does not apply to the following:

60.110b(d)(1)

Vessels at coke oven by-product plants.

60.110b(d)(2)

Pressure vessels designed to operate in excess of 204.9 kPa and without emissions to the atmosphere.

60.110b(d)(3)

Vessels permanently attached to mobile vehicles such as trucks, railcars, barges, or ships.

60.110b(d)(4)

Vessels with a design capacity less than or equal to 1,589.874 m^3 used for petroleum or condensate stored, processed, or treated prior to custody transfer.

60.110b(d)(5)

Vessels located at bulk gasoline plants.

60.110b(d)(6)

Storage vessels located at gasoline service stations.

60.110b(d)(7)

Vessels used to store beverage alcohol.

60.110b(d)(8)

Vessels subject to subpart GGGG of 40 CFR part 63.

The above applicability exemptions do not apply to the Terminal.

60.110b(e) Alternative means of compliance—

60.110b(e)(1) Option to comply with part 65.

Owners or operators may choose to comply with 40 CFR part 65, subpart C, to satisfy the requirements of § § 60.112b through 60.117b for storage vessels that are subject to this subpart that meet the specifications in paragraphs (e)(1)(i) and (ii) of this section. When choosing to comply with 40 CFR part 65, subpart C, the monitoring requirements of § 60.116b(c), (e), (f)(1), and (g) still apply. Other provisions applying to owners or operators who choose to comply with 40 CFR part 65 are provided in 40 CFR 65.1.

60.110b(e)(1)(i)

A storage vessel with a design capacity greater than or equal to 151 m^3 containing a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 5.2 kPa; or

60.110b(e)(1)(ii)

A storage vessel with a design capacity greater than 75 m^3 but less than 151 m^3 containing a VOL that,

as stored, has a maximum true vapor pressure equal to or greater than 27.6 kPa.

60.110b(e)(2) Part 60, subpart A.

Owners or operators who choose to comply with 40 CFR part 65, subpart C, must also comply with § § 60.1, 60.2, 60.5, 60.6, 60.7(a)(1) and (4), 60.14, 60.15, and 60.16 for those storage vessels. All sections and paragraphs of subpart A of this part that are not mentioned in this paragraph (e)(2) do not apply to owners or operators of storage vessels complying with 40 CFR part 65, subpart C, except that provisions required to be met prior to implementing 40 CFR part 65 still apply. Owners and operators who choose to comply with 40 CFR part 65, subpart C, must comply with 40 CFR part 65, subpart A.

60.110b(e)(3) Internal floating roof report.

If an owner or operator installs an internal floating roof and, at initial startup, chooses to comply with 40 CFR part 65, subpart C, a report shall be furnished to the Administrator stating that the control equipment meets the specifications of 40 CFR 65.43. This report shall be an attachment to the notification required by 40 CFR 65.5(b).

60.110b(e)(4) External floating roof report.

If an owner or operator installs an external floating roof and, at initial startup, chooses to comply with 40 CFR part 65, subpart C, a report shall be furnished to the Administrator stating that the control equipment meets the specifications of 40 CFR 65.44. This report shall be an attachment to the notification required by 40 CFR 65.5(b).

[52 FR 11429, Apr. 8, 1987, as amended at 54 FR 32973, Aug. 11, 1989; 65 FR 78275, Dec. 14, 2000; 68 FR 59332, Oct. 15, 2003]

Alternative means of compliance for Subpart Kb would apply only to the tanks that are subject directly to NSPS Subpart Kb. TLO is required to comply with specific provisions of this subpart under NESHAP Subpart R.

§ 60.111b Definitions.

Terms used in this subpart are defined in the Act, in subpart A of this part, or in this subpart as follows:

Bulk gasoline plant means any gasoline distribution facility that has a gasoline throughput less than or equal to 75,700 liters per day. Gasoline throughput shall be the maximum calculated design throughput as may be limited by compliance with an enforceable condition under Federal requirement or Federal, State or local law, and discoverable by the Administrator and any other person.

Condensate means hydrocarbon liquid separated from natural gas that condenses due to changes in the temperature or pressure, or both, and remains liquid at standard conditions.

Custody transfer means the transfer of produced petroleum and/or condensate, after processing and/or treatment in the producing operations, from storage vessels or automatic transfer facilities to pipelines or any other forms of transportation.

Fill means the introduction of VOL into a storage vessel but not necessarily to complete capacity.

Gasoline service station means any site where gasoline is dispensed to motor vehicle fuel tanks from stationary storage tanks.

Maximum true vapor pressure means the equilibrium partial pressure exerted by the volatile organic compounds (as defined in 40 CFR 51.100) in the stored VOL at the temperature equal to the highest

calendar-month average of the VOL storage temperature for VOL's stored above or below the ambient temperature or at the local maximum monthly average temperature as reported by the National Weather Service for VOL's stored at the ambient temperature, as determined:

(1) In accordance with methods described in American Petroleum institute Bulletin 2517, Evaporation Loss From External Floating Roof Tanks, (incorporated by reference—see § 60.17); or

(2) As obtained from standard reference texts; or

(3) As determined by ASTM D2879–83, 96, or 97 (incorporated by reference—see § 60.17);

(4) Any other method approved by the Administrator.

Petroleum means the crude oil removed from the earth and the oils derived from tar sands, shale, and coal.

Petroleum liquids means petroleum, condensate, and any finished or intermediate products manufactured in a petroleum refinery.

Process tank means a tank that is used within a process (including a solvent or raw material recovery process) to collect material discharged from a feedstock storage vessel or equipment within the process before the material is transferred to other equipment within the process, to a product or by-product storage vessel, or to a vessel used to store recovered solvent or raw material. In many process tanks, unit operations such as reactions and blending are conducted. Other process tanks, such as surge control vessels and bottoms receivers, however, may not involve unit operations.

Reid vapor pressure means the absolute vapor pressure of volatile crude oil and volatile nonviscous petroleum liquids except liquified petroleum gases, as determined by ASTM D323–82 or 94 (incorporated by reference—see § 60.17).

Storage vessel means each tank, reservoir, or container used for the storage of volatile organic liquids but does not include:

(1) Frames, housing, auxiliary supports, or other components that are not directly involved in the containment of liquids or vapors;

(2) Subsurface caverns or porous rock reservoirs; or

(3) Process tanks.

Volatile organic liquid (VOL) means any organic liquid which can emit volatile organic compounds (as defined in 40 CFR 51.100) into the atmosphere.

Waste means any liquid resulting from industrial, commercial, mining or agricultural operations, or from community activities that is discarded or is being accumulated, stored, or physically, chemically, or biologically treated prior to being discarded or recycled.

[52 FR 11429, Apr. 8, 1987, as amended at 54 FR 32973, Aug. 11, 1989; 65 FR 61756, Oct. 17, 2000; 68 FR 59333, Oct. 15, 2003]

TLO understands these definitions and has used the definitions in preparing this regulatory review.

§ 60.112b Standard for volatile organic compounds (VOC).

60.112b(a)

The owner or operator of each storage vessel either with a design capacity greater than or equal to 151 m^3 containing a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 5.2 kPa but less than 76.6 kPa or with a design capacity greater than or equal to 75 m^3 but less than 151 m^3 containing a VOL that, as stored, has a maximum true vapor pressure equal to or greater than 27.6 kPa but less than 76.6 kPa, shall equip each storage vessel with one of the following:

60.112b(a)(1)

A fixed roof in combination with an internal floating roof meeting the following specifications:

60.112b(a)(1)(i)

The internal floating roof shall rest or float on the liquid surface (but not necessarily in complete contact with it) inside a storage vessel that has a fixed roof. The internal floating roof shall be floating on the liquid surface at all times, except during initial fill and during those intervals when the storage vessel is completely emptied or subsequently emptied and refilled. When the roof is resting on the leg supports, the process of filling, emptying, or refilling shall be continuous and shall be accomplished as rapidly as possible.

60.112b(a)(1)(ii)

Each internal floating roof shall be equipped with one of the following closure devices between the wall of the storage vessel and the edge of the internal floating roof:

60.112b(a)(1)(ii)(A)

A foam- or liquid-filled seal mounted in contact with the liquid (liquid-mounted seal). A liquid-mounted seal means a foam- or liquid-filled seal mounted in contact with the liquid between the wall of the storage vessel and the floating roof continuously around the circumference of the tank.

60.112b(a)(1)(ii)(B)

Two seals mounted one above the other so that each forms a continuous closure that completely covers the space between the wall of the storage vessel and the edge of the internal floating roof. The lower seal may be vapor-mounted, but both must be continuous.

60.112b(a)(1)(ii)(C)

A mechanical shoe seal. A mechanical shoe seal is a metal sheet held vertically against the wall of the storage vessel by springs or weighted levers and is connected by braces to the floating roof. A flexible coated fabric (envelope) spans the annular space between the metal sheet and the floating roof.

60.112b(a)(1)(iii)

Each opening in a noncontact internal floating roof except for automatic bleeder vents (vacuum breaker vents) and the rim space vents is to provide a projection below the liquid surface.

TLO is subject to the above requirements for all gasoline storage vessels at the Terminal. Gasoline storage vessels are required to comply with these control standards by using either an internal floating roof (IFR), an external floating roof (EFR), a closed vent system and control device, or an equivalent control system to reduce emissions from each tank.

TLO is currently complying with these requirements by storing gasoline in tanks equipped with IFRs. These IFR tanks meet the requirements of NSPS Subpart Kb, including those indicated by

NESHAP Subpart R (40 CFR 60.112b(a)(1), except §§60.112b(a)(1)(iv) through (ix)).

60.112b(a)(1)(iv)

Each opening in the internal floating roof except for leg sleeves, automatic bleeder vents, rim space vents, column wells, ladder wells, sample wells, and stub drains is to be equipped with a cover or lid which is to be maintained in a closed position at all times (i.e., no visible gap) except when the device is in actual use. The cover or lid shall be equipped with a gasket. Covers on each access hatch and automatic gauge float well shall be bolted except when they are in use.

60.112b(a)(1)(v)

Automatic bleeder vents shall be equipped with a gasket and are to be closed at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports.

60.112b(a)(1)(vi)

Rim space vents shall be equipped with a gasket and are to be set to open only when the internal floating roof is not floating or at the manufacturer's recommended setting.

60.112b(a)(1)(vii)

Each penetration of the internal floating roof for the purpose of sampling shall be a sample well. The sample well shall have a slit fabric cover that covers at least 90 percent of the opening.

60.112b(a)(1)(viii)

Each penetration of the internal floating roof that allows for passage of a column supporting the fixed roof shall have a flexible fabric sleeve seal or a gasketed sliding cover.

60.112b(a)(1)(ix)

Each penetration of the internal floating roof that allows for passage of a ladder shall have a gasketed sliding cover.

TLO is subject to the above requirements (40 CFR 60.112b(a)(1)(iv) through (ix)) for Tanks 919, 920, 921, and 922, which are subject to Kb. These tanks are equipped with IFRs. These IFR tanks meet the requirements of NSPS Subpart Kb.

60.112b(a)(2)

An external floating roof. An external floating roof means a pontoon-type or double-deck type cover that rests on the liquid surface in a vessel with no fixed roof. Each external floating roof must meet the following specifications:

60.112b(a)(2)(i)

Each external floating roof shall be equipped with a closure device between the wall of the storage vessel and the roof edge. The closure device is to consist of two seals, one above the other. The lower seal is referred to as the primary seal, and the upper seal is referred to as the secondary seal.

60.112b(a)(2)(i)(A)

The primary seal shall be either a mechanical shoe seal or a liquid-mounted seal. Except as provided in §

60.113b(b)(4), the seal shall completely cover the annular space between the edge of the floating roof and tank wall.

60.112b(a)(2)(i)(B)

The secondary seal shall completely cover the annular space between the external floating roof and the wall of the storage vessel in a continuous fashion except as allowed in § 60.113b(b)(4).

60.112b(a)(2)(ii)

Except for automatic bleeder vents and rim space vents, each opening in a noncontact external floating roof shall provide a projection below the liquid surface. Except for automatic bleeder vents, rim space vents, roof drains, and leg sleeves, each opening in the roof is to be equipped with a gasketed cover, seal, or lid that is to be maintained in a closed position at all times (i.e., no visible gap) except when the device is in actual use. Automatic bleeder vents are to be closed at all times when the roof is floating except when the roof is being floated off or is being landed on the roof leg supports. Rim vents are to be set to open when the roof is being floated off the roof legs supports or at the manufacturer's recommended setting. Automatic bleeder vents and rim space vents are to be gasketed. Each emergency roof drain is to be provided with a slotted membrane fabric cover that covers at least 90 percent of the area of the opening.

60.112b(a)(2)(iii)

The roof shall be floating on the liquid at all times (i.e., off the roof leg supports) except during initial fill until the roof is lifted off leg supports and when the tank is completely emptied and subsequently refilled. The process of filling, emptying, or refilling when the roof is resting on the leg supports shall be continuous and shall be accomplished as rapidly as possible.

60.112b(a)(3)

A closed vent system and control device meeting the following specifications:

60.112b(a)(3)(i)

The closed vent system shall be designed to collect all VOC vapors and gases discharged from the storage vessel and operated with no detectable emissions as indicated by an instrument reading of less than 500 ppm above background and visual inspections, as determined in part 60, subpart VV, § 60.485(b).

60.112b(a)(3)(ii)

The control device shall be designed and operated to reduce inlet VOC emissions by 95 percent or greater. If a flare is used as the control device, it shall meet the specifications described in the general control device requirements (§ 60.18) of the General Provisions.

60.112b(a)(4)

A system equivalent to those described in paragraphs (a)(1), (a)(2), or (a)(3) of this section as provided in § 60.114b of this subpart.

TLO is subject to the above requirements for all gasoline storage vessels at the Terminal. Gasoline storage vessels are required to comply with these control standards by using either an internal floating roof (IFR), an external floating roof (EFR), a closed vent system and control device, or an equivalent control system to reduce emissions from each tank.

TLO is currently complying with these requirements by storing gasoline in tanks equipped with IFRs. These IFR tanks meet the requirements of NSPS Subpart Kb, including those indicated by NESHAP Subpart R.

60.112b(b)

The owner or operator of each storage vessel with a design capacity greater than or equal to 75 m^3 which contains a VOL that, as stored, has a maximum true vapor pressure greater than or equal to 76.6 kPa shall equip each storage vessel with one of the following:

60.112b(b)(1)

A closed vent system and control device as specified in § 60.112b(a)(3).

60.112b(b)(2)

A system equivalent to that described in paragraph (b)(1) as provided in § 60.114b of this subpart.

TLO does not currently store any species with a vapor pressure in excess of 76.6 kPa (11.1 psia) at this terminal.

60.112b(c) Site-specific standard for Merck & Co., Inc.'s Stonewall Plant in Elkton, Virginia.

This paragraph applies only to the pharmaceutical manufacturing facility, commonly referred to as the Stonewall Plant, located at Route 340 South, in Elkton, Virginia ("site").

60.112b(c)(1)

For any storage vessel that otherwise would be subject to the control technology requirements of paragraphs (a) or (b) of this section, the site shall have the option of either complying directly with the requirements of this subpart, or reducing the site-wide total criteria pollutant emissions cap (total emissions cap) in accordance with the procedures set forth in a permit issued pursuant to 40 CFR 52.2454. If the site chooses the option of reducing the total emissions cap in accordance with the procedures set forth in such permit, the requirements of such permit shall apply in lieu of the otherwise applicable requirements of this subpart for such storage vessel.

60.112b(c)(2)

For any storage vessel at the site not subject to the requirements of 40 CFR 60.112b (a) or (b), the requirements of 40 CFR 60.116b (b) and (c) and the General Provisions (subpart A of this part) shall not apply.

[52 FR 11429, Apr. 8, 1987, as amended at 62 FR 52641, Oct. 8, 1997]

§ 60.113b Testing and procedures.

The owner or operator of each storage vessel as specified in § 60.112b(a) shall meet the requirements of paragraph (a), (b), or (c) of this section. The applicable paragraph for a particular storage vessel depends on the control equipment installed to meet the requirements of § 60.112b.

TLO is subject to the NESHAP requirement to control gasoline storage tanks under § 60.112b; therefore, TLO is also required under the NESHAP to demonstrate compliance with the emission standards using the provisions of § 60.113b. As all gasoline storage tanks at the Terminal are equipped with IFRs, the IFR provisions below are noted as applicable. These are the provisions

currently incorporated in the Tier II operating permit.

60.113b(a)

After installing the control equipment required to meet § 60.112b(a)(1) (permanently affixed roof and internal floating roof), each owner or operator shall:

60.113b(a)(1)

Visually inspect the internal floating roof, the primary seal, and the secondary seal (if one is in service), prior to filling the storage vessel with VOL. If there are holes, tears, or other openings in the primary seal, the secondary seal, or the seal fabric or defects in the internal floating roof, or both, the owner or operator shall repair the items before filling the storage vessel.

60.113b(a)(2)

For Vessels equipped with a liquid-mounted or mechanical shoe primary seal, visually inspect the internal floating roof and the primary seal or the secondary seal (if one is in service) through manholes and roof hatches on the fixed roof at least once every 12 months after initial fill. If the internal floating roof is not resting on the surface of the VOL inside the storage vessel, or there is liquid accumulated on the roof, or the seal is detached, or there are holes or tears in the seal fabric, the owner or operator shall repair the items or empty and remove the storage vessel from service within 45 days. If a failure that is detected during inspections required in this paragraph cannot be repaired within 45 days and if the vessel cannot be emptied within 45 days, a 30-day extension may be requested from the Administrator in the inspection report required in § 60.115b(a)(3). Such a request for an extension must document that alternate storage capacity is unavailable and specify a schedule of actions the company will take that will assure that the control equipment will be repaired or the vessel will be emptied as soon as possible.

60.113b(a)(3)

For vessels equipped with a double-seal system as specified in § 60.112b(a)(1)(ii)(B):

60.113b(a)(3)(i)

Visually inspect the vessel as specified in paragraph (a)(4) of this section at least every 5 years; or

60.113b(a)(3)(ii)

Visually inspect the vessel as specified in paragraph (a)(2) of this section.

60.113b(a)(4)

Visually inspect the internal floating roof, the primary seal, the secondary seal (if one is in service), gaskets, slotted membranes and sleeve seals (if any) each time the storage vessel is emptied and degassed. If the internal floating roof has defects, the primary seal has holes, tears, or other openings in the seal or the seal fabric, or the secondary seal has holes, tears, or other openings in the seal or the seal fabric, or the gaskets no longer close off the liquid surfaces from the atmosphere, or the slotted membrane has more than 10 percent open area, the owner or operator shall repair the items as necessary so that none of the conditions specified in this paragraph exist before refilling the storage vessel with VOL. In no event shall inspections conducted in accordance with this provision occur at intervals greater than 10 years in the case of vessels conducting the annual visual inspection as specified in paragraphs (a)(2) and (a)(3)(ii) of this section and at intervals no greater than 5 years in the case of vessels specified in paragraph (a)(3)(i) of this section.

60.113b(a)(5)

Notify the Administrator in writing at least 30 days prior to the filling or refilling of each storage vessel for which an inspection is required by paragraphs (a)(1) and (a)(4) of this section to afford the Administrator the opportunity to have an observer present. If the inspection required by paragraph (a)(4) of this section is not planned and the owner or operator could not have known about the inspection 30 days in advance or refilling the tank, the owner or operator shall notify the Administrator at least 7 days prior to the refilling of the storage vessel. Notification shall be made by telephone immediately followed by written documentation demonstrating why the inspection was unplanned. Alternatively, this notification including the written documentation may be made in writing and sent by express mail so that it is received by the Administrator at least 7 days prior to the refilling.

60.113b(b)

After installing the control equipment required to meet § 60.112b(a)(2) (external floating roof), the owner or operator shall:

60.113b(b)(1)

Determine the gap areas and maximum gap widths, between the primary seal and the wall of the storage vessel and between the secondary seal and the wall of the storage vessel according to the following frequency.

60.113b(b)(1)(i)

Measurements of gaps between the tank wall and the primary seal (seal gaps) shall be performed during the hydrostatic testing of the vessel or within 60 days of the initial fill with VOL and at least once every 5 years thereafter.

60.113b(b)(1)(ii)

Measurements of gaps between the tank wall and the secondary seal shall be performed within 60 days of the initial fill with VOL and at least once per year thereafter.

60.113b(b)(1)(iii)

If any source ceases to store VOL for a period of 1 year or more, subsequent introduction of VOL into the vessel shall be considered an initial fill for the purposes of paragraphs (b)(1)(i) and (b)(1)(ii) of this section.

60.113b(b)(2)

Determine gap widths and areas in the primary and secondary seals individually by the following procedures:

60.113b(b)(2)(i)

Measure seal gaps, if any, at one or more floating roof levels when the roof is floating off the roof leg supports.

60.113b(b)(2)(ii)

Measure seal gaps around the entire circumference of the tank in each place where a 0.32-cm diameter uniform probe passes freely (without forcing or binding against seal) between the seal and the wall of the storage vessel and measure the circumferential distance of each such location.

60.113b(b)(2)(iii)

The total surface area of each gap described in paragraph (b)(2)(ii) of this section shall be determined by using probes of various widths to measure accurately the actual distance from the tank wall to the seal and multiplying each such width by its respective circumferential distance.

60.113b(b)(3)

Add the gap surface area of each gap location for the primary seal and the secondary seal individually and divide the sum for each seal by the nominal diameter of the tank and compare each ratio to the respective standards in paragraph (b)(4) of this section.

60.113b(b)(4)

Make necessary repairs or empty the storage vessel within 45 days of identification in any inspection for seals not meeting the requirements listed in (b)(4) (i) and (ii) of this section:

60.113b(b)(4)(i)

The accumulated area of gaps between the tank wall and the mechanical shoe or liquid-mounted primary seal shall not exceed 212 Cm^2 per meter of tank diameter, and the width of any portion of any gap shall not exceed 3.81 cm.

60.113b(b)(4)(i)(A)

One end of the mechanical shoe is to extend into the stored liquid, and the other end is to extend a minimum vertical distance of 61 cm above the stored liquid surface.

60.113b(b)(4)(i)(B)

There are to be no holes, tears, or other openings in the shoe, seal fabric, or seal envelope.

60.113b(b)(4)(ii)

The secondary seal is to meet the following requirements:

60.113b(b)(4)(ii)(A)

The secondary seal is to be installed above the primary seal so that it completely covers the space between the roof edge and the tank wall except as provided in paragraph (b)(2)(iii) of this section.

60.113b(b)(4)(ii)(B)

The accumulated area of gaps between the tank wall and the secondary seal shall not exceed 21.2 cm^2 per meter of tank diameter, and the width of any portion of any gap shall not exceed 1.27 cm.

60.113b(b)(4)(ii)(C)

There are to be no holes, tears, or other openings in the seal or seal fabric.

60.113b(b)(4)(iii)

If a failure that is detected during inspections required in paragraph (b)(1) of § 60.113b(b) cannot be repaired within 45 days and if the vessel cannot be emptied within 45 days, a 30-day extension may be requested from the Administrator in the inspection report required in § 60.115b(b)(4). Such extension

request must include a demonstration of unavailability of alternate storage capacity and a specification of a schedule that will assure that the control equipment will be repaired or the vessel will be emptied as soon as possible.

60.113b(b)(5)

Notify the Administrator 30 days in advance of any gap measurements required by paragraph (b)(1) of this section to afford the Administrator the opportunity to have an observer present.

60.113b(b)(6)

Visually inspect the external floating roof, the primary seal, secondary seal, and fittings each time the vessel is emptied and degassed.

60.113b(b)(6)(i)

If the external floating roof has defects, the primary seal has holes, tears, or other openings in the seal or the seal fabric, or the secondary seal has holes, tears, or other openings in the seal or the seal fabric, the owner or operator shall repair the items as necessary so that none of the conditions specified in this paragraph exist before filling or refilling the storage vessel with VOL.

60.113b(b)(6)(ii)

For all the inspections required by paragraph (b)(6) of this section, the owner or operator shall notify the Administrator in writing at least 30 days prior to the filling or refilling of each storage vessel to afford the Administrator the opportunity to inspect the storage vessel prior to refilling. If the inspection required by paragraph (b)(6) of this section is not planned and the owner or operator could not have known about the inspection 30 days in advance of refilling the tank, the owner or operator shall notify the Administrator at least 7 days prior to the refilling of the storage vessel. Notification shall be made by telephone immediately followed by written documentation demonstrating why the inspection was unplanned. Alternatively, this notification including the written documentation may be made in writing and sent by express mail so that it is received by the Administrator at least 7 days prior to the refilling.

60.113b(c)

The owner or operator of each source that is equipped with a closed vent system and control device as required in § 60.112b (a)(3) or (b)(2) (other than a flare) is exempt from § 60.8 of the General Provisions and shall meet the following requirements.

60.113b(c)(1)

Submit for approval by the Administrator as an attachment to the notification required by § 60.7(a)(1) or, if the facility is exempt from § 60.7(a)(1), as an attachment to the notification required by § 60.7(a)(2), an operating plan containing the information listed below.

60.113b(c)(1)(i)

Documentation demonstrating that the control device will achieve the required control efficiency during maximum loading conditions. This documentation is to include a description of the gas stream which enters the control device, including flow and VOC content under varying liquid level conditions (dynamic and static) and manufacturer's design specifications for the control device. If the control device or the closed vent capture system receives vapors, gases, or liquids other than fuels from sources that are not designated sources under this subpart, the efficiency demonstration is to include consideration of all vapors, gases, and liquids received by the closed vent capture system and control device. If an enclosed combustion device with a minimum residence time of 0.75 seconds and a minimum temperature of 816 °

C is used to meet the 95 percent requirement, documentation that those conditions will exist is sufficient to meet the requirements of this paragraph.

60.113b(c)(1)(ii)

A description of the parameter or parameters to be monitored to ensure that the control device will be operated in conformance with its design and an explanation of the criteria used for selection of that parameter (or parameters).

60.113b(c)(2)

Operate the closed vent system and control device and monitor the parameters of the closed vent system and control device in accordance with the operating plan submitted to the Administrator in accordance with paragraph (c)(1) of this section, unless the plan was modified by the Administrator during the review process. In this case, the modified plan applies.

60.113b(d)

The owner or operator of each source that is equipped with a closed vent system and a flare to meet the requirements in § 60.112b (a)(3) or (b)(2) shall meet the requirements as specified in the general control device requirements, § 60.18 (e) and (f).

The gasoline storage tanks at the Terminal are not equipped with EFRs, fixed roofs, or closed vent systems.

[52 FR 11429, Apr. 8, 1987, as amended at 54 FR 32973, Aug. 11, 1989]

§ 60.114b Alternative means of emission limitation.

According to the requirements of the NESHAP, TLO has the opportunity to use the provisions of § 60.114b to evaluate alternative means of emission limitation for the emission standards under § 60.112b. At this time, the tanks at the Terminal are in compliance with the standards under § 60.112b and do not use alternative means of emission limitation published in the **Federal Register*.***

60.114b(a)

If, in the Administrator's judgment, an alternative means of emission limitation will achieve a reduction in emissions at least equivalent to the reduction in emissions achieved by any requirement in § 60.112b, the Administrator will publish in the *Federal Register* a notice permitting the use of the alternative means for purposes of compliance with that requirement.

60.114b(b)

Any notice under paragraph (a) of this section will be published only after notice and an opportunity for a hearing.

60.114b(c)

Any person seeking permission under this section shall submit to the Administrator a written application including:

60.114b(c)(1)

An actual emissions test that uses a full-sized or scale-model storage vessel that accurately collects and

measures all VOC emissions from a given control device and that accurately simulates wind and accounts for other emission variables such as temperature and barometric pressure.

60.114b(c)(2)

An engineering evaluation that the Administrator determines is an accurate method of determining equivalence.

60.114b(d)

The Administrator may condition the permission on requirements that may be necessary to ensure operation and maintenance to achieve the same emissions reduction as specified in § 60.112b.

§ 60.115b Reporting and recordkeeping requirements.

The owner or operator of each storage vessel as specified in § 60.112b(a) shall keep records and furnish reports as required by paragraphs (a), (b), or (c) of this section depending upon the control equipment installed to meet the requirements of § 60.112b. The owner or operator shall keep copies of all reports and records required by this section, except for the record required by (c)(1), for at least 2 years. The record required by (c)(1) will be kept for the life of the control equipment.

60.115b(a)

After installing control equipment in accordance with § 60.112b(a)(1) (fixed roof and internal floating roof), the owner or operator shall meet the following requirements.

60.115b(a)(1)

Furnish the Administrator with a report that describes the control equipment and certifies that the control equipment meets the specifications of § 60.112b(a)(1) and § 60.113b(a)(1). This report shall be an attachment to the notification required by § 60.7(a)(3).

60.115b(a)(2)

Keep a record of each inspection performed as required by § 60.113b (a)(1), (a)(2), (a)(3), and (a)(4). Each record shall identify the storage vessel on which the inspection was performed and shall contain the date the vessel was inspected and the observed condition of each component of the control equipment (seals, internal floating roof, and fittings).

60.115b(a)(3)

If any of the conditions described in § 60.113b(a)(2) are detected during the annual visual inspection required by § 60.113b(a)(2), a report shall be furnished to the Administrator within 30 days of the inspection. Each report shall identify the storage vessel, the nature of the defects, and the date the storage vessel was emptied or the nature of and date the repair was made.

60.115b(a)(4)

After each inspection required by § 60.113b(a)(3) that finds holes or tears in the seal or seal fabric, or defects in the internal floating roof, or other control equipment defects listed in § 60.113b(a)(3)(ii), a report shall be furnished to the Administrator within 30 days of the inspection. The report shall identify the storage vessel and the reason it did not meet the specifications of § 61.112b(a)(1) or § 60.113b(a)(3) and list each repair made.

According to the requirements of the NESHAP, TLO has the opportunity to use the provisions of §

60.115b to fulfill reporting and recordkeeping requirements for the emission standards under § 60.112b. Subject tanks at the Terminal are equipped with IFRs to comply with the standards under § 60.112b; therefore, only the provisions applicable to IFR tanks are applicable to the Terminal, as shown in the Terminal's Tier II operating permit.

60.115b(b)

After installing control equipment in accordance with § 61.112b(a)(2) (external floating roof), the owner or operator shall meet the following requirements.

60.115b(b)(1)

Furnish the Administrator with a report that describes the control equipment and certifies that the control equipment meets the specifications of § 60.112b(a)(2) and § 60.113b(b)(2), (b)(3), and (b)(4). This report shall be an attachment to the notification required by § 60.7(a)(3).

60.115b(b)(2)

Within 60 days of performing the seal gap measurements required by § 60.113b(b)(1), furnish the Administrator with a report that contains:

60.115b(b)(2)(i)

The date of measurement.

60.115b(b)(2)(ii)

The raw data obtained in the measurement.

60.115b(b)(2)(iii)

The calculations described in § 60.113b (b)(2) and (b)(3).

60.115b(b)(3)

Keep a record of each gap measurement performed as required by § 60.113b(b). Each record shall identify the storage vessel in which the measurement was performed and shall contain:

60.115b(b)(3)(i)

The date of measurement.

60.115b(b)(3)(ii)

The raw data obtained in the measurement.

60.115b(b)(3)(iii)

The calculations described in § 60.113b (b)(2) and (b)(3).

60.115b(b)(4)

After each seal gap measurement that detects gaps exceeding the limitations specified by § 60.113b(b)(4), submit a report to the Administrator within 30 days of the inspection. The report will identify the vessel and contain the information specified in paragraph (b)(2) of this section and the date the vessel

was emptied or the repairs made and date of repair.

60.115b(c)

After installing control equipment in accordance with § 60.112b (a)(3) or (b)(1) (closed vent system and control device other than a flare), the owner or operator shall keep the following records.

60.115b(c)(1)

A copy of the operating plan.

60.115b(c)(2)

A record of the measured values of the parameters monitored in accordance with § 60.113b(c)(2).

60.115b(d)

After installing a closed vent system and flare to comply with § 60.112b, the owner or operator shall meet the following requirements.

60.115b(d)(1)

A report containing the measurements required by § 60.18(f) (1), (2), (3), (4), (5), and (6) shall be furnished to the Administrator as required by § 60.8 of the General Provisions. This report shall be submitted within 6 months of the initial start-up date.

60.115b(d)(2)

Records shall be kept of all periods of operation during which the flare pilot flame is absent.

60.115b(d)(3)

Semiannual reports of all periods recorded under § 60.115b(d)(2) in which the pilot flame was absent shall be furnished to the Administrator.

According to the requirements of the NESHAP, TLO has the opportunity to use the provisions of § 60.115b to fulfill reporting and recordkeeping requirements for the emission standards under § 60.112b. Subject tanks at the Terminal are equipped with IFRs to comply with the standards under § 60.112b; therefore, only the provisions applicable to IFR tanks are applicable to the Terminal, as shown in the Terminal's Tier II operating permit.

§ 60.116b Monitoring of operations.

60.116b(a)

The owner or operator shall keep copies of all records required by this section, except for the record required by paragraph (b) of this section, for at least 2 years. The record required by paragraph (b) of this section will be kept for the life of the source.

The Terminal is required to comply with the NESHAP recordkeeping requirement of 5 years' duration as specified at 40 CFR 63.428(d).

60.116b(b)

The owner or operator of each storage vessel as specified in § 60.110b(a) shall keep readily accessible

records showing the dimension of the storage vessel and an analysis showing the capacity of the storage vessel.

60.116b(c)

Except as provided in paragraphs (f) and (g) of this section, the owner or operator of each storage vessel either with a design capacity greater than or equal to 151 m^3 storing a liquid with a maximum true vapor pressure greater than or equal to 3.5 kPa or with a design capacity greater than or equal to 75 m^3 but less than 151 m^3 storing a liquid with a maximum true vapor pressure greater than or equal to 15.0 kPa shall maintain a record of the VOL stored, the period of storage, and the maximum true vapor pressure of that VOL during the respective storage period.

60.116b(d)

Except as provided in paragraph (g) of this section, the owner or operator of each storage vessel either with a design capacity greater than or equal to 151 m^3 storing a liquid with a maximum true vapor pressure that is normally less than 5.2 kPa or with a design capacity greater than or equal to 75 m^3 but less than 151 m^3 storing a liquid with a maximum true vapor pressure that is normally less than 27.6 kPa shall notify the Administrator within 30 days when the maximum true vapor pressure of the liquid exceeds the respective maximum true vapor vapor pressure values for each volume range.

60.116b(e)

Available data on the storage temperature may be used to determine the maximum true vapor pressure as determined below.

60.116b(e)(1)

For vessels operated above or below ambient temperatures, the maximum true vapor pressure is calculated based upon the highest expected calendar-month average of the storage temperature. For vessels operated at ambient temperatures, the maximum true vapor pressure is calculated based upon the maximum local monthly average ambient temperature as reported by the National Weather Service.

60.116b(e)(2)

For crude oil or refined petroleum products the vapor pressure may be obtained by the following:

60.116b(e)(2)(i)

Available data on the Reid vapor pressure and the maximum expected storage temperature based on the highest expected calendar-month average temperature of the stored product may be used to determine the maximum true vapor pressure from nomographs contained in API Bulletin 2517 (incorporated by reference—see § 60.17), unless the Administrator specifically requests that the liquid be sampled, the actual storage temperature determined, and the Reid vapor pressure determined from the sample(s).

60.116b(e)(2)(ii)

The true vapor pressure of each type of crude oil with a Reid vapor pressure less than 13.8 kPa or with physical properties that preclude determination by the recommended method is to be determined from available data and recorded if the estimated maximum true vapor pressure is greater than 3.5 kPa.

60.116b(e)(3)

For other liquids, the vapor pressure:

60.116b(e)(3)(i)

May be obtained from standard reference texts, or

60.116b(e)(3)(ii)

Determined by ASTM D2879–83, 96, or 97 (incorporated by reference—see § 60.17); or

60.116b(e)(3)(iii)

Measured by an appropriate method approved by the Administrator; or

60.116b(e)(3)(iv)

Calculated by an appropriate method approved by the Administrator.

60.116b(f)

The owner or operator of each vessel storing a waste mixture of indeterminate or variable composition shall be subject to the following requirements.

60.116b(f)(1)

Prior to the initial filling of the vessel, the highest maximum true vapor pressure for the range of anticipated liquid compositions to be stored will be determined using the methods described in paragraph (e) of this section.

60.116b(f)(2)

For vessels in which the vapor pressure of the anticipated liquid composition is above the cutoff for monitoring but below the cutoff for controls as defined in § 60.112b(a), an initial physical test of the vapor pressure is required; and a physical test at least once every 6 months thereafter is required as determined by the following methods:

60.116b(f)(2)(i)

ASTM D2879–83, 96, or 97 (incorporated by reference—see § 60.17); or

60.116b(f)(2)(ii)

ASTM D323–82 or 94 (incorporated by reference—see § 60.17); or

60.116b(f)(2)(iii)

As measured by an appropriate method as approved by the Administrator.

60.116b(g)

The owner or operator of each vessel equipped with a closed vent system and control device meeting the specification of § 60.112b or with emissions reductions equipment as specified in 40 CFR 65.42(b)(4), (b)(5), (b)(6), or (c) is exempt from the requirements of paragraphs (c) and (d) of this section.

No tanks at the Terminal are equipped with closed vent systems.

[52 FR 11429, Apr. 8, 1987, as amended at 65 FR 61756, Oct. 17, 2000; 65 FR 78276, Dec. 14, 2000; 68

FR 59333, Oct. 15, 2003]

§ 60.117b Delegation of authority.

60.117b(a)

In delegating implementation and enforcement authority to a State under section 111(c) of the Act, the authorities contained in paragraph (b) of this section shall be retained by the Administrator and not transferred to a State.

60.117b(b)

Authorities which will not be delegated to States: § § 60.111b(f)(4), 60.114b, 60.116b(e)(3)(iii), 60.116b(e)(3)(iv), and 60.116b(f)(2)(iii).

The above provisions are applicable to the delegated authorities rather than to the Terminal.

[52 FR 11429, Apr. 8, 1987, as amended at 52 FR 22780, June 16, 1987]

Highlighted text indicated applicable sections.

Bold and Italic text notes TLO comments.

SUBPART XX—Standards of Performance for Bulk Gasoline Terminals

Source Notes

Source: 48 FR 37590, Aug. 18, 1983, unless otherwise noted.

§ 60.500 Applicability and designation of affected facility.

60.500(a)

The affected facility to which the provisions of this subpart apply is the total of all the loading racks at a bulk gasoline terminal which deliver liquid product into gasoline tank trucks.

60.500(b)

Each facility under paragraph (a) of this section, the construction or modification of which is commenced after December 17, 1980, is subject to the provisions of this subpart.

The loading rack at the Terminal is not currently subject to this NSPS. As stated in the facility's statement of basis for the Terminal's original Tier II operating permit issued on January 22, 2003: "Since the VDU is not a modification or a reconstruction of the loading racks, Chevron is not subject to the provisions of this subpart" (p. 7). No modification or reconstruction has occurred since the issuance of the 2003 operating permit.

As discussed in the application report, NESHAP Subpart R applies to the Terminal. NESHAP Subpart R references several provisions of NSPS Subpart XX, as described in this form FRA.

60.500(c)

For purposes of this subpart, any replacement of components of an existing facility, described in paragraph (a) of this section, commenced before August 18, 1983 in order to comply with any emission standard adopted by a State or political subdivision thereof will not be considered a reconstruction under the provisions of 40 CFR 60.15.

Note: The intent of these standards is to minimize the emissions of VOC through the application of best demonstrated technologies (BDT). The numerical emission limits in this standard are expressed in terms of total organic compounds. This emission limit reflects the performance of BDT.

§ 60.501 Definitions.

The terms used in this subpart are defined in the Clean Air Act, in § 60.2 of this part, or in this section as follows:

Bulk gasoline terminal means any gasoline facility which receives gasoline by pipeline, ship or barge, and has a gasoline throughput greater than 75,700 liters per day. Gasoline throughput shall be the maximum calculated design throughput as may be limited by compliance with an enforceable condition under Federal, State or local law and discoverable by the Administrator and any other person.

Continuous vapor processing system means a vapor processing system that treats total organic

compounds vapors collected from gasoline tank trucks on a demand basis without intermediate accumulation in a vapor holder.

Existing vapor processing system means a vapor processing system [capable of achieving emissions to the atmosphere no greater than 80 milligrams of total organic compounds per liter of gasoline loaded], the construction or refurbishment of which was commenced before December 17, 1980, and which was not constructed or refurbished after that date.

Flare means a thermal oxidation system using an open (without enclosure) flame.

Gasoline means any petroleum distillate or petroleum distillate/alcohol blend having a Reid vapor pressure of 27.6 kilopascals or greater which is used as a fuel for internal combustion engines.

Gasoline tank truck means a delivery tank truck used at bulk gasoline terminals which is loading gasoline or which has loaded gasoline on the immediately previous load.

Intermittent vapor processing system means a vapor processing system that employs an intermediate vapor holder to accumulate total organic compounds vapors collected from gasoline tank trucks, and treats the accumulated vapors only during automatically controlled cycles.

Loading rack means the loading arms, pumps, meters, shutoff valves, relief valves, and other piping and valves necessary to fill delivery tank trucks.

Refurbishment means, with reference to a vapor processing system, replacement of components of, or addition of components to, the system within any 2-year period such that the fixed capital cost of the new components required for such component replacement or addition exceeds 50 percent of the cost of a comparable entirely new system.

Thermal oxidation system means a combustion device used to mix and ignite fuel, air pollutants, and air to provide a flame to heat and oxidize hazardous air pollutants. Auxiliary fuel may be used to heat air pollutants to combustion temperatures.

Total organic compounds means those compounds measured according to the procedures in § 60.503.

Vapor collection system means any equipment used for containing total organic compounds vapors displaced during the loading of gasoline tank trucks.

Vapor processing system means all equipment used for recovering or oxidizing total organic compounds vapors displaced from the affected facility.

Vapor-tight gasoline tank truck means a gasoline tank truck which has demonstrated within the 12 preceding months that its product delivery tank will sustain a pressure change of not more than 750 pascals (75 mm of water) within 5 minutes after it is pressurized to 4,500 pascals (450 mm of water). This capability is to be demonstrated using the pressure test procedure specified in Method 27.

TLO understands these definitions and has used these definitions in preparing this regulatory review.

[48 FR 37590, Aug. 18, 1983, as amended at 65 FR 61763, Oct. 17, 2000; 68 FR 70965, Dec. 19, 2003]

§ 60.502 Standard for Volatile Organic Compound (VOC) emissions from bulk gasoline terminals.

40 CFR 63.422(a), NESHAP Subpart R references all paragraphs of § 60.502 except for (b), (c) and (j).

On and after the date on which § 60.8(a) requires a performance test to be completed, the owner or operator of each bulk gasoline terminal containing an affected facility shall comply with the requirements of this section.

60.502(a)

Each affected facility shall be equipped with a vapor collection system designed to collect the total organic compounds vapors displaced from tank trucks during product loading.

60.502(b)

The emissions to the atmosphere from the vapor collection system due to the loading of liquid product into gasoline tank trucks are not to exceed 35 milligrams of total organic compounds per liter of gasoline loaded, except as noted in paragraph (c) of this section.

60.502(c)

For each affected facility equipped with an existing vapor processing system, the emissions to the atmosphere from the vapor collection system due to the loading of liquid product into gasoline tank trucks are not to exceed 80 milligrams of total organic compounds per liter of gasoline loaded.

The loading rack at the Terminal is not required to comply with the emission standards at §§60.502(b) and (c) because the Terminal is not directly subject to this NSPS. The reference to this NSPS at 40 CFR 63.422(a) does not include paragraphs (b) and (c). Instead, Subpart R, includes a more stringent standard at §63.422(b):

> ***Emissions to the atmosphere from the vapor collection and processing systems due to the loading of gasoline cargo tanks shall not exceed 10 milligrams of total organic compounds per liter of gasoline loaded.***

60.502(d)

Each vapor collection system shall be designed to prevent any total organic compounds vapors collected at one loading rack from passing to another loading rack.

60.502(e)

Loadings of liquid product into gasoline tank trucks shall be limited to vapor-tight gasoline tank trucks using the following procedures:

60.502(e)(1)

The owner or operator shall obtain the vapor tightness documentation described in § 60.505(b) for each gasoline tank truck which is to be loaded at the affected facility.

60.502(e)(2)

The owner or operator shall require the tank identification number to be recorded as each gasoline tank truck is loaded at the affected facility.

60.502(e)(3)

60.502(e)(3)(i)

The owner or operator shall cross-check each tank identification number obtained in paragraph (e)(2) of this section with the file of tank vapor tightness documentation within 2 weeks after the corresponding tank is loaded, unless either of the following conditions is maintained:

60.502(e)(3)(i)(A)

If less than an average of one gasoline tank truck per month over the last 26 weeks is loaded without vapor tightness documentation then the documentation cross-check shall be performed each quarter; or

60.502(e)(3)(i)(B)

If less than an average of one gasoline tank truck per month over the last 52 weeks is loaded without vapor tightness documentation then the documentation cross-check shall be performed semiannually.

60.502(e)(3)(ii)

If either the quarterly or semiannual cross-check provided in paragraphs (e)(3)(i) (A) through (B) of this section reveals that these conditions were not maintained, the source must return to biweekly monitoring until such time as these conditions are again met.

60.502(e)(4)

The terminal owner or operator shall notify the owner or operator of each non-vapor-tight gasoline tank truck loaded at the affected facility within 1 week of the documentation cross-check in paragraph (e)(3) of this section.

60.502(e)(5)

The terminal owner or operator shall take steps assuring that the nonvapor-tight gasoline tank truck will not be reloaded at the affected facility until vapor tightness documentation for that tank is obtained.

§ 60.502(e)(5) applies to the Terminal, but it is changed to read as follows at 40 CFR 63.422(c)(2):

(2) Section 60.502(e)(5) of this chapter is changed to read: The terminal owner or operator shall take steps assuring that the nonvapor-tight gasoline cargo tank will not be reloaded at the facility until vapor tightness documentation for that gasoline cargo tank is obtained which documents that:

- (i) The tank truck or railcar gasoline cargo tank meets the test requirements in § 63.425(e), or the railcar gasoline cargo tank meets applicable test requirements in § 63.425(i);
- (ii) For each gasoline cargo tank failing the test in § 63.425 (f) or (g) at the facility, the cargo tank either:
  - (A) Before repair work is performed on the cargo tank, meets the test requirements in § 63.425 (g) or (h), or
  - (B) After repair work is performed on the cargo tank before or during the tests in § 63.425 (g) or (h), subsequently passes the annual certification test described in § 63.425(e).

60.502(e)(6)

Alternate procedures to those described in paragraphs (e)(1) through (5) of this section for limiting

gasoline tank truck loadings may be used upon application to, and approval by, the Administrator.

60.502(f)

The owner or operator shall act to assure that loadings of gasoline tank trucks at the affected facility are made only into tanks equipped with vapor collection equipment that is compatible with the terminal's vapor collection system.

60.502(g)

The owner or operator shall act to assure that the terminal's and the tank truck's vapor collection systems are connected during each loading of a gasoline tank truck at the affected facility. Examples of actions to accomplish this include training drivers in the hookup procedures and posting visible reminder signs at the affected loading racks.

60.502(h)

The vapor collection and liquid loading equipment shall be designed and operated to prevent gauge pressure in the delivery tank from exceeding 4,500 pascals (450 mm of water) during product loading. This level is not to be exceeded when measured by the procedures specified in § 60.503(d).

60.502(i)

No pressure-vacuum vent in the bulk gasoline terminal's vapor collection system shall begin to open at a system pressure less than 4,500 pascals (450 mm of water).

As noted at 40 CFR 63.422(e), the following alternative compliance option is also available to the Terminal:

(e) As an alternative to 40 CFR 60.502(h) and (i) as specified in paragraph (a) of this section, the owner or operator may comply with paragraphs (e)(1) and (2) of this section.
  (1) The owner or operator shall design and operate the vapor processing system, vapor collection system, and liquid loading equipment to prevent gauge pressure in the railcar gasoline cargo tank from exceeding the applicable test limits in § 63.425(e) and (i) during product loading. This level is not to be exceeded when measured by the procedures specified in 40 CFR 60.503(d) of this chapter.
  (2) No pressure-vacuum vent in the bulk gasoline terminal's vapor processing system or vapor collection system may begin to open at a system pressure less than the applicable test limits in § 63.425(e) or (i).

60.502(j)

Each calendar month, the vapor collection system, the vapor processing system, and each loading rack handling gasoline shall be inspected during the loading of gasoline tank trucks for total organic compounds liquid or vapor leaks. For purposes of this paragraph, detection methods incorporating sight, sound, or smell are acceptable. Each detection of a leak shall be recorded and the source of the leak repaired within 15 calendar days after it is detected.

The loading rack at the Terminal is not required to comply with the emission standard at §§60.502(j) because the Terminal is not directly subject to this NSPS. The reference to this NSPS at 40 CFR 63.422(a) does not include paragraph (j). Instead, Subpart R includes its own LDAR program at 40 CFR 63.424.

[48 FR 37590, Aug. 18, 1983; 48 FR 56580, Dec. 22, 1983, as amended at 54 FR 6678, Feb. 14, 1989; 64 FR 7466, Feb. 12, 1999]

§ 60.503 Test methods and procedures.

60.503(a)

In conducting the performance tests required in § 60.8, the owner or operator shall use as reference methods and procedures the test methods in appendix A of this part or other methods and procedures as specified in this section, except as provided in § 60.8(b). The three-run requirement of § 60.8(f) does not apply to this subpart.

60.503(b)

Immediately before the performance test required to determine compliance with § 60.502 (b), (c), and (h), the owner or operator shall use Method 21 to monitor for leakage of vapor all potential sources in the terminal's vapor collection system equipment while a gasoline tank truck is being loaded. The owner or operator shall repair all leaks with readings of 10,000 ppm (as methane) or greater before conducting the performance test.

60.503(c)

The owner or operator shall determine compliance with the standards in § 60.502 (b) and (c) as follows:

60.503(c)(1)

The performance test shall be 6 hours long during which at least 300,000 liters of gasoline is loaded. If this is not possible, the test may be continued the same day until 300,000 liters of gasoline is loaded or the test may be resumed the next day with another complete 6-hour period. In the latter case, the 300,000-liter criterion need not be met. However, as much as possible, testing should be conducted during the 6-hour period in which the highest throughput normally occurs.

60.503(c)(2)

If the vapor processing system is intermittent in operation, the performance test shall begin at a reference vapor holder level and shall end at the same reference point. The test shall include at least two startups and shutdowns of the vapor processor. If this does not occur under automatically controlled operations, the system shall be manually controlled.

60.503(c)(3)

The emission rate (E) of total organic compounds shall be computed using the following equation:

$$E = K\sum_{i=1}^{n}\left(V_{esi}C_{ei}\right)/\left(L\,10^{6}\right)$$

where:

E=emission rate of total organic compounds, mg/liter of gasoline loaded.

V_{esi}=volume of air-vapor mixture exhausted at each interval “i”, scm.

C_{ei}=concentration of total organic compounds at each interval “i”, ppm.

L=total volume of gasoline loaded, liters.

n=number of testing intervals.

i=emission testing interval of 5 minutes.

K=density of calibration gas, 1.83×10^{6} for propane and 2.41×10^{6} for butane, mg/scm.

60.503(c)(4)

The performance test shall be conducted in intervals of 5 minutes. For each interval "i", readings from each measurement shall be recorded, and the volume exhausted (V_{esi}) and the corresponding average total organic compounds concentration (C_{ei}) shall be determined. The sampling system response time shall be considered in determining the average total organic compounds concentration corresponding to the volume exhausted.

60.503(c)(5)

The following methods shall be used to determine the volume (V_{esi}) air-vapor mixture exhausted at each interval:

60.503(c)(5)(i)

Method 2B shall be used for combustion vapor processing systems.

60.503(c)(5)(ii)

Method 2A shall be used for all other vapor processing systems.

60.503(c)(6)

Method 25A or 25B shall be used for determining the total organic compounds concentration (C_{ei}) at each interval. The calibration gas shall be either propane or butane. The owner or operator may exclude the methane and ethane content in the exhaust vent by any method (e.g., Method 18) approved by the Administrator.

60.503(c)(7)

To determine the volume (L) of gasoline dispensed during the performance test period at all loading racks whose vapor emissions are controlled by the processing system being tested, terminal records or readings from gasoline dispensing meters at each loading rack shall be used.

At 40 CFR 63.425(a)(1), it is required that the facility comply with the test methods and procedures in 40 CFR 60.503 to demonstrate compliance with the NESHAP emission standard for the loading rack and vapor control system.

60.503(d)

The owner or operator shall determine compliance with the standard in § 60.502(h) as follows:

60.503(d)(1)

A pressure measurement device (liquid manometer, magnehelic gauge, or equivalent instrument), capable of measuring up to 500 mm of water gauge pressure with ± 2.5 mm of water precision, shall be calibrated and installed on the terminal's vapor collection system at a pressure tap located as close as possible to the connection with the gasoline tank truck.

60.503(d)(2)

During the performance test, the pressure shall be recorded every 5 minutes while a gasoline truck is being loaded; the highest instantaneous pressure that occurs during each loading shall also be recorded. Every loading position must be tested at least once during the performance test.

60.503(e)

The performance test requirements of paragraph (c) of this section do not apply to flares defined in § 60.501 and meeting the requirements in § 60.18(b) through (f). The owner or operator shall demonstrate that the flare and associated vapor collection system is in compliance with the requirements in § § 60.18(b) through (f) and 60.503(a), (b), and (d).

60.503(f)

The owner or operator shall use alternative test methods and procedures in accordance with the alternative test method provisions in § 60.8(b) for flares that do not meet the requirements in § 60.18(b).

[54 FR 6678, Feb. 14, 1989; 54 FR 21344, Feb. 14, 1989, as amended at 68 FR 70965, Dec. 19, 2003]

§ 60.504 [Reserved]

§ 60.505 Reporting and recordkeeping.

Regulations § 60.505 do not apply to the Terminal because the Terminal is not subject to the NSPS. NESHAP Subpart R does not reference any provisions of § 60.505.

60.505(a)

The tank truck vapor tightness documentation required under § 60.502(e)(1) shall be kept on file at the terminal in a permanent form available for inspection.

60.505(b)

The documentation file for each gasoline tank truck shall be updated at least once per year to reflect current test results as determined by Method 27. This documentation shall include, as a minimum, the following information:

60.505(b)(1)

Test title: Gasoline Delivery Tank Pressure Test—EPA Reference Method 27.

60.505(b)(2)

Tank owner and address.

60.505(b)(3)

Tank identification number.

60.505(b)(4)

Testing location.

60.505(b)(5)

Date of test.

60.505(b)(6)

Tester name and signature.

60.505(b)(7)

Witnessing inspector, if any: Name, signature, and affiliation.

60.505(b)(8)

Test results: Actual pressure change in 5 minutes, mm of water (average for 2 runs).

As shown in Condition 3.12 of the Terminal's Tier II operating permit, the Terminal is required to collect annual certification testing for each truck under 40 CFR 63.428(b)(3).

60.505(c)

A record of each monthly leak inspection required under § 60.502(j) shall be kept on file at the terminal for at least 2 years. Inspection records shall include, as a minimum, the following information:

60.505(c)(1)

Date of inspection.

60.505(c)(2)

Findings (may indicate no leaks discovered; or location, nature, and severity of each leak).

60.505(c)(3)

Leak determination method.

60.505(c)(4)

Corrective action (date each leak repaired; reasons for any repair interval in excess of 15 days).

60.505(c)(5)

Inspector name and signature.

The Terminal's current Tier II operating permit shows that the facility will comply with the 40 CFR 63 Subpart R leak detection and repair program. The recordkeeping requirements of that program, as set forth at §63.428(e) and (f), will be used to demonstrate compliance.

60.505(d)

The terminal owner or operator shall keep documentation of all notifications required under § 60.502(e)(4) on file at the terminal for at least 2 years.

60.505(e)

As an alternative to keeping records at the terminal of each gasoline cargo tank test result as required in paragraphs (a), (c), and (d) of this section, an owner or operator may comply with the requirements in either paragraph (e)(1) or (2) of this section.

60.505(e)(1)

An electronic copy of each record is instantly available at the terminal.

60.505(e)(1)(i)

The copy of each record in paragraph (e)(1) of this section is an exact duplicate image of the original paper record with certifying signatures.

60.505(e)(1)(ii)

The permitting authority is notified in writing that each terminal using this alternative is in compliance with paragraph (e)(1) of this section.

60.505(e)(2)

For facilities that utilize a terminal automation system to prevent gasoline cargo tanks that do not have valid cargo tank vapor tightness documentation from loading (*e.g.*, via a card lock-out system), a copy of the documentation is made available (*e.g.*, via facsimile) for inspection by permitting authority representatives during the course of a site visit, or within a mutually agreeable time frame.

60.505(e)(2)(i)

The copy of each record in paragraph (e)(2) of this section is an exact duplicate image of the original paper record with certifying signatures.

60.505(e)(2)(ii)

The permitting authority is notified in writing that each terminal using this alternative is in compliance with paragraph (e)(2) of this section.

60.505(f)

The owner or operator of an affected facility shall keep records of all replacements or additions of components performed on an existing vapor processing system for at least 3 years.

[48 FR 37590, Aug. 18, 1983; 48 FR 56580, Dec. 22, 1983, as amended at 68 FR 70965, Dec. 19, 2003]

§ 60.506 Reconstruction.

For purposes of this subpart:

60.506(a)

The cost of the following frequently replaced components of the affected facility shall not be considered in calculating either the “fixed capital cost of the new components” or the “fixed capital costs that would be required to construct a comparable entirely new facility” under § 60.15: pump seals, loading arm gaskets and swivels, coupler gaskets, overfill sensor couplers and cables, flexible vapor hoses, and grounding cables and connectors.

60.506(b)

Under § 60.15, the “fixed capital cost of the new components” includes the fixed capital cost of all depreciable components (except components specified in § 60.506(a)) which are or will be replaced pursuant to all continuous programs of component replacement which are commenced within any 2-year period following December 17, 1980. For purposes of this paragraph, “commenced” means that an owner or operator has undertaken a continuous program of component replacement or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of component replacement.

TLO has read and understands these definitions relating to reconstruction which apply under Subpart XX.

Highlighted text indicated applicable sections.

Bold and Italic text denotes TLO explanatory notes.

SUBPART R— National Emission Standards for Gasoline Distribution Facilities (Bulk Gasoline Terminals and Pipeline Breakout Stations)

§ 63.420 Applicability.

(a) The affected source to which the provisions of this subpart apply is each bulk gasoline terminal, except those bulk gasoline terminals:

(1) For which the owner or operator has documented and recorded to the Administrator's satisfaction that the result, E_T , of the following equation is less than 1, and complies with requirements in paragraphs (c), (d), (e), and (f) of this section:

a. $E_T = CF[0.59(T_F)(1-CE)+0.17(T_E)+0.08(T_{ES})+0.038(T_I)+8.5\times10^{-6}(C)+KQ]+0.04(OE)$

b. where:

c. E_T = emissions screening factor for bulk gasoline terminals;

d. CF=0.161 for bulk gasoline terminals and pipeline breakout stations that do not handle any reformulated or oxygenated gasoline containing 7.6 percent by volume or greater methyl tert-butyl ether (MTBE), OR

e. CF=1.0 for bulk gasoline terminals and pipeline breakout stations that handle reformulated or oxygenated gasoline containing 7.6 percent by volume or greater MTBE;

f. CE=control efficiency limitation on potential to emit for the vapor processing system used to control emissions from fixed-roof gasoline storage vessels [value should be added in decimal form (percent divided by 100)];

g. T_F = total number of fixed-roof gasoline storage vessels without an internal floating roof;

h. T_E = total number of external floating roof gasoline storage vessels with only primary seals;

i. T_{ES} = total number of external floating roof gasoline storage vessels with primary and secondary seals;

j. T_I = total number of fixed-roof gasoline storage vessels with an internal floating roof;

k. C = number of valves, pumps, connectors, loading arm valves, and open-ended lines in gasoline service;

l. Q=gasoline throughput limitation on potential to emit or gasoline throughput limit in compliance with paragraphs (c), (d), and (f) of this section (liters/day);

m. $K = 4.52\times10^{-6}$ for bulk gasoline terminals with uncontrolled loading racks (no vapor collection and processing systems), *OR*

n. $K = (4.5\times10^{-9})(EF + L)$ for bulk gasoline terminals with controlled loading racks (loading racks that have vapor collection and processing systems installed on the emission stream);

o. EF=emission rate limitation on potential to emit for the gasoline cargo tank loading rack vapor processor outlet emissions (mg of total organic compounds per liter of gasoline loaded);

p. OE=other HAP emissions screening factor for bulk gasoline terminals or pipeline breakout stations (tons per year). OE equals the total HAP from other emission sources not specified in parameters in the equations for E_T or E_P . If the value of 0.04(OE) is greater than 5 percent of either E_T or E_P , then paragraphs (a)(1) and (b)(1) of this section shall not be used to determine applicability;

q. L = 13 mg/l for gasoline cargo tanks meeting the requirement to satisfy the test criteria for a vapor-tight gasoline tank truck in § 60.501 of this chapter, *OR*

r. L = 304 mg/l for gasoline cargo tanks not meeting the requirement to satisfy the test criteria for a vapor-tight gasoline tank truck in § 60.501 of this chapter; or

(2) For which the owner or operator has documented and recorded to the Administrator's satisfaction that the facility is not a major source, or is not located within a contiguous area and under common control of a facility that is a major source, as defined in § 63.2 of subpart A of this part.

(b) The affected source to which the provisions of this subpart apply is each pipeline breakout station, except those pipeline breakout stations:

(1) For which the owner or operator has documented and recorded to the Administrator's satisfaction that the result, E_P , of the following equation is less than 1, and complies with requirements in paragraphs (c), (d), (e), and (f) of this section:

a. $E_P = CF\ [6.7(T_F)(1\text{-}CE) + 0.21(T_E) + 0.093(T_{ES}) + 0.1(T_I) + 5.31\times10^{-6}\ (C)) + 0.04(OE)$;

b. where:

c. EP=emissions screening factor for pipeline breakout stations,

d. and the definitions for CF, T_F , CE, T_E , T_{ES} , TI, C, and OE are the same as provided in paragraph (a)(1) of this section; or

(2) For which the owner or operator has documented and recorded to the Administrator's satisfaction that the facility is not a major source, or is not located within a contiguous area and under common control of a facility that is a major source, as defined in § 63.2 of subpart A of this part.

(c) A facility for which the results, E_T or E_P , of the calculation in paragraph (a)(1) or (b)(1) of this section has been documented and is less than 1.0 but greater than or equal to 0.50, is exempt from the requirements of this subpart, except that the owner or operator shall:

(1) Operate the facility such that none of the facility parameters used to calculate results under paragraph (a)(1) or (b)(1) of this section, and approved by the Administrator, is exceeded in any rolling 30-day period; and

(2) Maintain records and provide reports in accordance with the provisions of § 63.428(i).

(d) A facility for which the results, E_T or E_P , of the calculation in paragraph (a)(1) or (b)(1) of this section has been documented and is less than 0.50, is exempt from the requirements of this subpart, except that the owner or operator shall:

(1) Operate the facility such that none of the facility parameters used to calculate results under paragraph (a)(1) or (b)(1) of this section is exceeded in any rolling 30-day period; and

(2) Maintain records and provide reports in accordance with the provisions of § 63.428(j).

(e) The provisions of paragraphs (a)(1) and (b)(1) of this section shall not be used to determine applicability to bulk gasoline terminals or pipeline breakout stations that are either:

(1) Located within a contiguous area and under common control with another bulk gasoline terminal or pipeline breakout station, or

(2) Located within a contiguous area and under common control with other sources not specified in paragraphs (a)(1) or (b)(1) of this section, that emit or have the potential to emit a hazardous air pollutant.

(f) Upon request by the Administrator, the owner or operator of a bulk gasoline terminal or pipeline breakout station subject to the provisions of any paragraphs in this section including, but not limited to, the parameters and assumptions used in the applicable equation in paragraph (a)(1) or (b)(1) of this section, shall demonstrate compliance with those paragraphs.

(g) Each owner or operator of a bulk gasoline terminal or pipeline breakout station subject to the provisions of this subpart that is also subject to applicable provisions of 40 CFR part 60, subpart Kb or XX of this chapter shall comply only with the provisions in each subpart that contain the most stringent control requirements for that facility.

(h) Each owner or operator of an affected source bulk gasoline terminal or pipeline breakout station is subject to the provisions of 40 CFR part 63, subpart A—General Provisions, as indicated in Table 1.

(i) A bulk gasoline terminal or pipeline breakout station with a Standard Industrial Classification code 2911 located within a contiguous area and under common control with a refinery complying with subpart CC, §§ 63.646, 63.648, 63.649, and 63.650 is not subject to subpart R standards, except as specified in subpart CC, § 63.650.

(j) *Rules stayed for reconsideration.* Notwithstanding any other provision of this subpart, the December 14, 1995 compliance date for existing facilities in § 63.424(e) and § 63.428(a), (i)(1), and (j)(1) of this subpart is stayed from December 8, 1995, to March 7, 1996.

The Terminal was previously subject to NESHAP Subpart R in the Tier II operating permit 077-00023 issued in 2008. The applicability originates from an EPA determination on February 4, 2000 in accordance with the 1995 EPA memorandum from John S. Seitz titled "Potential to Emit for

MACT Standards – Guidance on Timing Issues". Within this PTC application, TLO is not proposing any revisions to the Terminal's status under this subpart.

[59 FR 64318, Dec. 14, 1994, as amended at 60 FR 43260, Aug. 18, 1995; 60 FR 62992, Dec. 8, 1995; 62 FR 9092, Feb. 28, 1997]

§ 63.421 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act; in subparts A, K, Ka, Kb, and XX of part 60 of this chapter; or in subpart A of this part. All terms defined in both subpart A of part 60 of this chapter and subpart A of this part shall have the meaning given in subpart A of this part. For purposes of this subpart, definitions in this section supersede definitions in other parts or subparts.

Bulk gasoline terminal means any gasoline facility which receives gasoline by pipeline, ship or barge, and has a gasoline throughput greater than 75,700 liters per day. Gasoline throughput shall be the maximum calculated design throughput as may be limited by compliance with an enforceable condition under Federal, State or local law and discoverable by the Administrator and any other person.

Controlled loading rack, for the purposes of § 63.420, means a loading rack equipped with vapor collection and processing systems that reduce displaced vapor emissions to no more than 80 milligrams of total organic compounds per liter of gasoline loaded, as measured using the test methods and procedures in § 60.503 (a) through (c) of this chapter.

Equipment means each valve, pump, pressure relief device, sampling connection system, open-ended valve or line, and flange or other connector in the gasoline liquid transfer and vapor collection systems. This definition also includes the entire vapor processing system except the exhaust port(s) or stack(s).

Flare means a thermal oxidation system using an open (without enclosure) flame.

Gasoline cargo tank means a delivery tank truck or railcar which is loading gasoline or which has loaded gasoline on the immediately previous load.

In gasoline service means that a piece of equipment is used in a system that transfers gasoline or gasoline vapors.

Limitation(s) on potential to emit means limitation(s) limiting a source's potential to emit as defined in § 63.2 of subpart A of this part.

Operating parameter value means a value for an operating or emission parameter of the vapor processing system (e.g., temperature) which, if maintained continuously by itself or in combination with one or more other operating parameter values, determines that an owner or operator has complied with the applicable emission standard. The operating parameter value is determined using the procedures outlined in § 63.425(b).

Oxygenated gasoline means the same as defined in 40 CFR 80.2(rr).

Pipeline breakout station means a facility along a pipeline containing storage vessels used to relieve surges or receive and store gasoline from the pipeline for reinjection and continued transportation by pipeline or to other facilities.

Reformulated gasoline means the same as defined in 40 CFR 80.2(ee).

Thermal oxidation system means a combustion device used to mix and ignite fuel, air pollutants, and air to provide a flame to heat and oxidize hazardous air pollutants. Auxiliary fuel may be used to heat air pollutants to combustion temperatures.

Uncontrolled loading rack means a loading rack used to load gasoline cargo tanks that is not a controlled loading rack.

Vapor-tight gasoline cargo tank means a gasoline cargo tank which has demonstrated within the 12 preceding months that it meets the annual certification test requirements in § 63.425(e), and which is subject at all times to the test requirements in § 63.425 (f), (g), and (h).

Volatile organic liquid (VOL) means, for the purposes of this subpart, gasoline.

TLO understands these definitions and has used the definitions in preparing this regulatory review.

[59 FR 64318, Dec. 14, 1994, as amended at 62 FR 9093, Feb. 28, 1997; 68 FR 70965, Dec. 19, 2003]

§ 63.422 Standards: Loading racks.

(a) Each owner or operator of loading racks at a bulk gasoline terminal subject to the provisions of this subpart shall comply with the requirements in § 60.502 of this chapter except for paragraphs (b), (c), and (j) of that section. For purposes of this section, the term "affected facility" used in § 60.502 of this chapter means the loading racks that load gasoline cargo tanks at the bulk gasoline terminals subject to the provisions of this subpart.

TLO will comply with all applicable § 60.502 requirements as shown on the Form FRA for NSPS Subpart XX. The Terminal operates a gasoline loading rack that is subject to Subpart R.

(b) Emissions to the atmosphere from the vapor collection and processing systems due to the loading of gasoline cargo tanks shall not exceed 10 milligrams of total organic compounds per liter of gasoline loaded.

TLO shall continue to comply with this standard.

(c) Each owner or operator of a bulk gasoline terminal subject to the provisions of this subpart shall comply with § 60.502(e) of this chapter as follows:

(1) For the purposes of this section, the term "tank truck" as used in § 60.502(e) of this chapter means "cargo tank."

(2) Section 60.502(e)(5) of this chapter is changed to read: The terminal owner or operator shall take steps assuring that the nonvapor-tight gasoline cargo tank will not be reloaded at the facility until vapor tightness documentation for that gasoline cargo tank is obtained which documents that:

(i) The tank truck or railcar gasoline cargo tank meets the test requirements in § 63.425(e), or the railcar gasoline cargo tank meets applicable test requirements in § 63.425(i);

(ii) For each gasoline cargo tank failing the test in § 63.425 (f) or (g) at the facility, the cargo tank either:

(A) Before repair work is performed on the cargo tank, meets the test requirements in § 63.425 (g) or (h), or

(B) After repair work is performed on the cargo tank before or during the tests in § 63.425 (g) or (h), subsequently passes the annual certification test described in § 63.425(e).

TLO understands and accepts these definitions and provision changes for § 63.502(e). The rule change for NSPS Subpart XX is noted on the Form FRA analysis for that rule.

(d) Each owner or operator shall meet the requirements in all paragraphs of this section as expeditiously as practicable, but no later than December 15, 1997, at existing facilities and upon startup for new facilities.

The Terminal has already demonstrated initial compliance with this subpart. TLO shall remain in continuous compliance with all requirements of this section.

(e) As an alternative to 40 CFR 60.502(h) and (i) as specified in paragraph (a) of this section, the owner or operator may comply with paragraphs (e)(1) and (2) of this section.

(1) The owner or operator shall design and operate the vapor processing system, vapor collection system, and liquid loading equipment to prevent gauge pressure in the railcar gasoline cargo tank from exceeding the applicable test limits in § 63.425(e) and (i) during product loading. This level is not to be exceeded when measured by the procedures specified in 40 CFR 60.503(d) of this chapter.

(2) No pressure-vacuum vent in the bulk gasoline terminal's vapor processing system or vapor collection system may begin to open at a system pressure less than the applicable test limits in § 63.425(e) or (i).

TLO understands the rules for alternative vapor processing systems.

[59 FR 64318, Dec. 14, 1994; 60 FR 32913, June 26, 1995, as amended at 68 FR 70965, Dec. 19, 2003]

§ 63.423 Standards: Storage vessels.

(a) Each owner or operator of a bulk gasoline terminal or pipeline breakout station subject to the provisions of this subpart shall equip each gasoline storage vessel with a design capacity greater than or equal to 75 m^3 according to the requirements in § 60.112b(a) (1) through (4) of this chapter, except for the requirements in §§ 60.112b(a)(1) (iv) through (ix) and 60.112b(a)(2)(ii) of this chapter.

TLO will comply with all applicable § 60.112b requirements as shown on the Form FRA for NSPS Subpart Kb.

(b) Each owner or operator shall equip each gasoline external floating roof storage vessel with a design capacity greater than or equal to 75 m^3 according to the requirements in § 60.112b(a)(2)(ii) of this chapter if such storage vessel does not currently meet the requirements in paragraph (a) of this section.

As currently built, there are no tanks with EFR controls subject to this paragraph at the Terminal.

(c) Each gasoline storage vessel at existing bulk gasoline terminals and pipeline breakout stations shall be in compliance with the requirements in paragraphs (a) and (b) of this section as expeditiously as practicable, but no later than December 15, 1997. At new bulk gasoline terminals and pipeline breakout stations, compliance shall be achieved upon startup.

The Terminal has already demonstrated initial compliance with this subpart. TLO shall remain in continuous compliance with all requirements of this section.

§ 63.424 Standards: Equipment leaks.

(a) Each owner or operator of a bulk gasoline terminal or pipeline breakout station subject to the provisions of this subpart shall perform a monthly leak inspection of all equipment in gasoline service. For this inspection, detection methods incorporating sight, sound, and smell are acceptable. Each piece of equipment shall be inspected during the loading of a gasoline cargo tank.

(b) A log book shall be used and shall be signed by the owner or operator at the completion of each inspection. A section of the log shall contain a list, summary description, or diagram(s) showing the location of all equipment in gasoline service at the facility.

(c) Each detection of a liquid or vapor leak shall be recorded in the log book. When a leak is detected, an initial attempt at repair shall be made as soon as practicable, but no later than 5 calendar days after the leak is detected. Repair or replacement of leaking equipment shall be completed within 15 calendar days after detection of each leak, except as provided in paragraph (d) of this section.

(d) Delay of repair of leaking equipment will be allowed upon a demonstration to the Administrator that repair within 15 days is not feasible. The owner or operator shall provide the reason(s) a delay is needed and the date by which each repair is expected to be completed.

TLO shall continue to comply with the above requirements.

(e) Initial compliance with the requirements in paragraphs (a) through (d) of this section shall be achieved by existing sources as expeditiously as practicable, but no later than December 15, 1997. For new sources, initial compliance shall be achieved upon startup.

The Terminal has already demonstrated initial compliance with this subpart. TLO shall remain in continuous compliance with all requirements of this section.

(f) As an alternative to compliance with the provisions in paragraphs (a) through (d) of this section, owners or operators may implement an instrument leak monitoring program that has been demonstrated to the Administrator as at least equivalent.

(g) Owners and operators shall not allow gasoline to be handled in a manner that would result in vapor releases to the atmosphere for extended periods of time. Measures to be taken include, but are not limited to, the following:

(1) Minimize gasoline spills;
(2) Clean up spills as expeditiously as practicable;
(3) Cover all open gasoline containers with a gasketed seal when not in use;
(4) Minimize gasoline sent to open waste collection systems that collect and transport gasoline to reclamation and recycling devices, such as oil/water separators.

TLO shall continue to comply with the above requirements.

[59 FR 64318, Dec. 14, 1994, as amended at 61 FR 7723, Feb. 29, 1996]

§ 63.425 Test methods and procedures.

(a) Each owner or operator subject to the emission standard in § 63.422(b) or 40 CFR 60.112b(a)(3)(ii) shall comply with the requirements in paragraphs (a)(1) and (2) of this section.

TLO is subject to §63.422(b) and will therefore comply with the requirements below for loading rack source tests.

(1) Conduct a performance test on the vapor processing and collection systems according to either paragraph (a)(1)(i) or (ii) of this section.
    (i) Use the test methods and procedures in 40 CFR 60.503 of this chapter, except a reading of 500 ppm shall be used to determine the level of leaks to be repaired under 40 CFR 60.503(b), or
    (ii) Use alternative test methods and procedures in accordance with the alternative test method requirements in § 63.7(f).

(2) The performance test requirements of 40 CFR 60.503(c) do not apply to flares defined in § 63.421 and meeting the flare requirements in § 63.11(b). The owner or operator shall demonstrate that the flare and associated vapor collection system is in compliance with the requirements in § 63.11(b) and 40 CFR 60.503(a), (b), and (d), respectively.

Initial performance testing was performed upon installation of the VCU. TLO will comply with applicable performance test requirements for any additional performance tests, as required.

(b) For each performance test conducted under paragraph (a) of this section, the owner or operator shall determine a monitored operating parameter value for the vapor processing system using the following procedure:
    (1) During the performance test, continuously record the operating parameter under § 63.427(a);
    (2) Determine an operating parameter value based on the parameter data monitored during the performance test, supplemented by engineering assessments and the manufacturer's recommendations; and
    (3) Provide for the Administrator's approval the rationale for the selected operating parameter value, and monitoring frequency and averaging time, including data and calculations used to develop the value and a description of why the value, monitoring frequency, and averaging time demonstrate continuous compliance with the emission standard in § 63.422(b) or § 60.112b(a)(3)(ii) of this chapter.

During the initial performance test, the continuous monitoring system was determined to be a temperature monitor as required in this subpart at § 63.427(a)(3).

(c) For performance tests performed after the initial test, the owner or operator shall document the reasons for any change in the operating parameter value since the previous performance test.

TLO will document any changes in operating parameters resulting from any future performance tests.

(d) The owner or operator of each gasoline storage vessel subject to the provisions of § 63.423 shall comply with § 60.113b of this chapter. If a closed vent system and control device are used, as specified in § 60.112b(a)(3) of this chapter, to comply with the requirements in § 63.423, the owner or operator shall also comply with the requirements in paragraph (b) of this section.

TLO will comply with the requirements of 40 CFR 60.113b, as shown on the Form FRA analysis of NSPS Subpart Kb.

(e) *Annual certification test.* The annual certification test for gasoline cargo tanks shall consist of the following test methods and procedures:
    (1) Method 27, appendix A, 40 CFR part 60. Conduct the test using a time period (t) for the pressure and vacuum tests of 5 minutes. The initial pressure (P_i) for the pressure test shall be 460 mm H_2O (18 in. H_2O), gauge. The initial vacuum (V_i) for the vacuum test shall be 150 mm H_2O (6 in. H_2O), gauge. The maximum allowable pressure and

vacuum changes (Δ p, Δ v) are as shown in the second column of Table 2 of this paragraph.

TABLE 2—ALLOWABLE CARGO TANK TEST PRESSURE OR VACUUM CHANGE

Cargo tank or compartment capacity, liters (gal)	Annual certification-allowable pressure or vacuum change (Δ p, Δ v) in 5 minutes, mm H_2O (in. H_2O)	Allowable pressure change (Δ p) in 5 minutes at any time, mm H_2O (in. H_2O)
9,464 or more (2,500 or more)	25 (1.0)	64 (2.5)
9,463 to 5,678 (2,499 to 1,500)	38 (1.5)	76 (3.0)
5,679 to 3,785 (1,499 to 1,000)	51 (2.0)	89 (3.5)
3,782 or less (999 or less)	64 (2.5)	102 (4.0)

(2) Pressure test of the cargo tank's internal vapor valve as follows:

(i) After completing the tests under paragraph (e)(1) of this section, use the procedures in Method 27 to repressurize the tank to 460 mm H_2O (18 in. H_2O), gauge. Close the tank's internal vapor valve(s), thereby isolating the vapor return line and manifold from the tank.

(ii) Relieve the pressure in the vapor return line to atmospheric pressure, then reseal the line. After 5 minutes, record the gauge pressure in the vapor return line and manifold. The maximum allowable 5-minute pressure increase is 130 mm H_2O (5 in. H_2O).

(f) *Leak detection test.* The leak detection test shall be performed using Method 21, appendix A, 40 CFR part 60, except omit section 4.3.2 of Method 21. A vapor-tight gasoline cargo tank shall have no leaks at any time when tested according to the procedures in this paragraph.

(1) The leak definition shall be 21,000 ppm as propane. Use propane to calibrate the instrument, setting the span at the leak definition. The response time to 90 percent of the final stable reading shall be less than 8 seconds for the detector with the sampling line and probe attached.

(2) In addition to the procedures in Method 21, include the following procedures:

(i) Perform the test on each compartment during loading of that compartment or while the compartment is still under pressure.

(ii) To eliminate a positive instrument drift, the dwell time for each leak detection shall not exceed two times the instrument response time. Purge the instrument with ambient air between each leak detection. The duration of the purge shall be in excess of two instrument response times.

(iii) Attempt to block the wind from the area being monitored. Record the highest detector reading and location for each leak.

(g) *Nitrogen pressure decay field test.* For those cargo tanks with manifolded product lines, this test procedure shall be conducted on each compartment.

(1) Record the cargo tank capacity. Upon completion of the loading operation, record the total volume loaded. Seal the cargo tank vapor collection system at the vapor coupler. The sealing apparatus shall have a pressure tap. Open the internal vapor valve(s) of the cargo tank and record the initial headspace pressure. Reduce or increase, as necessary, the initial headspace pressure to 460 mm H_2O (18.0 in. H_2O), gauge by

releasing pressure or by adding commercial grade nitrogen gas from a high pressure cylinder capable of maintaining a pressure of 2,000 psig.

i. The cylinder shall be equipped with a compatible two-stage regulator with a relief valve and a flow control metering valve. The flow rate of the nitrogen shall be no less than 2 cfm. The maximum allowable time to pressurize cargo tanks with headspace volumes of 1,000 gallons or less to the appropriate pressure is 4 minutes. For cargo tanks with a headspace of greater than 1,000 gallons, use as a maximum allowable time to pressurize 4 minutes or the result from the equation below, whichever is greater.

(a) $T = V_h \times 0.004$

(b) where:

(c) T = maximum allowable time to pressurize the cargo tank, min;

(d) V_h = cargo tank headspace volume during testing, gal.

(3) It is recommended that after the cargo tank headspace pressure reaches approximately 460 mm H_2O (18 in. H_20), gauge, a fine adjust valve be used to adjust the headspace pressure to 460 mm H_2O (18.0 in. H_2O), gauge for the next 30 ±5 seconds.

(4) Reseal the cargo tank vapor collection system and record the headspace pressure after 1 minute. The measured headspace pressure after 1 minute shall be greater than the minimum allowable final headspace pressure (P_F) as calculated from the following equation:

(e) $$P_F = 18\left(\frac{(18-N)}{18}\right)^{\left(\frac{V_s}{3(V_h)}\right)}$$

(f) where:

(g) (P_F) = minimum allowable final headspace pressure, in. H_2O, gauge;

(h) V_s = total cargo tank shell capacity, gal;

(i) V_h = cargo tank headspace volume after loading, gal;

(j) 18.0 = initial pressure at start of test, in. H_2O, gauge;

(k) N = 5-minute continuous performance standard at any time from the third column of Table 2 of § 63.425(e)(i), inches H_2O.

(5) Conduct the internal vapor valve portion of this test by repressurizing the cargo tank headspace with nitrogen to 460 mm H_2O (18 in. H_2O), gauge. Close the internal vapor valve(s), wait for 30 ±5 seconds, then relieve the pressure downstream of the vapor valve in the vapor collection system to atmospheric pressure. Wait 15 seconds, then reseal the vapor collection system. Measure and record the pressure every minute for 5 minutes. Within 5 seconds of the pressure measurement at the end of 5 minutes, open the vapor valve and record the headspace pressure as the "final pressure."

(6) If the decrease in pressure in the vapor collection system is less than at least one of the interval pressure change values in Table 3 of this paragraph, or if the final pressure is equal to or greater than 20 percent of the 1-minute final headspace pressure determined in the test in paragraph (g)(3) of this section, then the cargo tank is considered to be a vapor-tight gasoline cargo tank.

TABLE 3—PRESSURE CHANGE FOR INTERNAL VAPOR VALVE TEST

Time interval	Interval pressure change, mm H_2O (in. H_2O)
After 1 minute	28 (1.1)
After 2 minutes	56 (2.2)
After 3 minutes	84 (3.3)
After 4 minutes	112 (4.4)

After 5 minutes	140 (5.5)

(h) *Continuous performance pressure decay test.* The continuous performance pressure decay test shall be performed using Method 27, appendix A, 40 CFR Part 60. Conduct only the positive pressure test using a time period (t) of 5 minutes. The initial pressure (P_i) shall be 460 mm H_2O (18 in. H_2O), gauge. The maximum allowable 5-minute pressure change (Δp) which shall be met at any time is shown in the third column of Table 2 of § 63.425(e)(1).

(i) *Railcar bubble leak test procedures.* As an alternative to paragraph (e) of this section for annual certification leakage testing of gasoline cargo tanks, the owner or operator may comply with paragraphs (i)(1) and (2) of this section for railcar gasoline cargo tanks, provided the railcar tank meets the requirement in paragraph (i)(3) of this section.

(1) Comply with the requirements of 49 CFR 173.31(d), 179.7, 180.509, and 180.511 for the testing of railcar gasoline cargo tanks.

(2) The leakage pressure test procedure required under 49 CFR 180.509(j) and used to show no indication of leakage under 49 CFR 180.511(f) shall be ASTM E 515-95 (incorporated by reference, see § 63.14), BS EN 1593:1999 (incorporated by reference, see § 63.14), or another bubble leak test procedure meeting the requirements in 49 CFR 179.7, 180.505, and 180.509.

(3) The alternative requirements in this paragraph (i) may not be used for any railcar gasoline cargo tank that collects gasoline vapors from a vapor balance system permitted under or required by a Federal, State, local, or tribal agency. A vapor balance system is a piping and collection system designed to collect gasoline vapors displaced from a storage vessel, barge, or other container being loaded, and routes the displaced gasoline vapors into the railcar gasoline cargo tank from which liquid gasoline is being unloaded.

TLO agrees to follow the Annual Certification methodology for gasoline tank trucks detailed above. The Pocatello terminal does not load railcar gasoline cargo tanks. As shown in Condition 3.12 of the Terminal's Tier II operating permit, the Terminal is required to collect annual certification testing data for each truck under 40 CFR 63.428(b)(3).

[59 FR 64318, Dec. 14, 1994; 60 FR 7627, Feb. 8, 1995; 60 FR 32913, June 26, 1995; 68 FR 70965, Dec. 19, 2003]

§ 63.426 Alternative means of emission limitation.

For determining the acceptability of alternative means of emission limitation for storage vessels under § 63.423, the provisions of § 60.114b of this chapter apply.

TLO maintains the right to use alternative means for limiting emissions of storage vessels if, in the Administrator's judgment, the alternative method will achieve at a reduction in emissions at least equivalent to the reduction in emissions achieved by any requirement in §60.112b, and which is submitted to the Administrator with testing and engineering evaluations. The Administrator shall be responsible for publishing in the Federal Register a notice permitting the use of the alternative means for purposes of compliance with that requirement after an opportunity for a hearing. At this time, TLO does not rely on alternative means of emission limitation to comply with this subpart.

§ 63.427 Continuous monitoring.

(a) Each owner or operator of a bulk gasoline terminal subject to the provisions of this subpart shall install, calibrate, certify, operate, and maintain, according to the manufacturer's specifications, a continuous monitoring system (CMS) as specified in paragraph (a)(1), (a)(2), (a)(3), or (a)(4) of this section, except as allowed in paragraph (a)(5) of this section.

TLO agrees to operate a CMS system.

(1) Where a carbon adsorption system is used, a continuous emission monitoring system (CEMS) capable of measuring organic compound concentration shall be installed in the exhaust air stream.

TLO does not operate a carbon adsorption system at this time.

(2) Where a refrigeration condenser system is used, a continuous parameter monitoring system (CPMS) capable of measuring temperature shall be installed immediately downstream from the outlet to the condenser section. Alternatively, a CEMS capable of measuring organic compound concentration may be installed in the exhaust air stream.

TLO does not operate a refrigeration condenser system at this time.

(3) Where a thermal oxidation system other than a flare is used, a CPMS capable of measuring temperature must be installed in the firebox or in the ductwork immediately downstream from the firebox in a position before any substantial heat exchange occurs.

The VCU is equipped with a temperature sensor to monitor the unit's exhaust gas temperature.

(4) Where a flare meeting the requirements in § 63.11(b) is used, a heat-sensing device, such as an ultraviolet beam sensor or a thermocouple, must be installed in proximity to the pilot light to indicate the presence of a flame.

(5) Monitoring an alternative operating parameter or a parameter of a vapor processing system other than those listed in this paragraph will be allowed upon demonstrating to the Administrator's satisfaction that the alternative parameter demonstrates continuous compliance with the emission standard in § 63.422(b) or § 60.112b(a)(3)(ii) of this chapter.

(b) Each owner or operator of a bulk gasoline terminal subject to the provisions of this subpart shall operate the vapor processing system in a manner not to exceed the operating parameter value for the parameter described in paragraphs (a)(1) and (a)(2) of this section, or to go below the operating parameter value for the parameter described in paragraph (a)(3) of this section, and established using the procedures in § 63.425(b). In cases where an alternative parameter pursuant to paragraph (a)(5) of this section is approved, each owner or operator shall operate the vapor processing system in a manner not to exceed or not to go below, as appropriate, the alternative operating parameter value. Operation of the vapor processing system in a manner exceeding or going below the operating parameter value, as specified above, shall constitute a violation of the emission standard in § 63.422(b).

TLO will continue to monitor the vapor processing unit with the prescribed monitoring requirements of §63.427(a). TLO is aware that operation outside the acceptable values for the monitored parameter is a violation of the standard.

(c) Each owner or operator of gasoline storage vessels subject to the provisions of § 63.423 shall comply with the monitoring requirements in § 60.116b of this chapter, except records shall be kept for at least 5 years. If a closed vent system and control device are used, as specified in § 60.112b(a)(3) of this chapter, to comply with the requirements in § 63.423, the owner or operator shall also comply with the requirements in paragraph (a) of this section.

TLO will maintain records of monitoring requirements for at least 5 years and comply with paragraph (a) of this section as necessary. Currently, no closed vent systems are used at any tanks at the Terminal.

[59 FR 46350, Sept. 8, 1994, as amended at 68 FR 70966, Dec. 19, 2003]

§ 63.428 Reporting and recordkeeping.

(a) The initial notifications required for existing affected sources under § 63.9(b)(2) shall be submitted by 1 year after an affected source becomes subject to the provisions of this subpart or by December 16, 1996, whichever is later. Affected sources that are major sources on December 16, 1996 and plan to be area sources by December 15, 1997 shall include in this notification a brief, non-binding description of and schedule for the action(s) that are planned to achieve area source status.

TLO has operated all affected sources in previous permits and therefore does not need to file any initial notifications for existing sources.

(b) Each owner or operator of a bulk gasoline terminal subject to the provisions of this subpart shall keep records of the test results for each gasoline cargo tank loading at the facility as follows:

(1) Annual certification testing performed under § 63.425(e) and railcar bubble leak testing performed under § 63.425(i); and

(2) Continuous performance testing performed at any time at that facility under § 63.425 (f), (g), and (h).

(3) The documentation file shall be kept up-to-date for each gasoline cargo tank loading at the facility. The documentation for each test shall include, as a minimum, the following information:

(iii) Name of test: Annual Certification Test—Method 27 (§ 63.425(e)(1)); Annual Certification Test—Internal Vapor Valve (§ 63.425(e)(2)); Leak Detection Test (§ 63.425(f)); Nitrogen Pressure Decay Field Test (§ 63.425(g)); Continuous Performance Pressure Decay Test (§ 63.425(h)); or Railcar Bubble Leak Test Procedure (§ 63.425(i)).

(iv) Cargo tank owner's name and address.

(v) Cargo tank identification number.

(vi) Test location and date.

(vii) Tester name and signature.

(viii) Witnessing inspector, if any: Name, signature, and affiliation.

(ix) Vapor tightness repair: Nature of repair work and when performed in relation to vapor tightness testing.

(x) Test results: test pressure; pressure or vacuum change, mm of water; time period of test; number of leaks found with instrument; and leak definition.

TLO will keep the records listed above.

(c) Each owner or operator of a bulk gasoline terminal subject to the provisions of this subpart shall:

(1) Keep an up-to-date, readily accessible record of the continuous monitoring data required under § 63.427(a). This record shall indicate the time intervals during which loadings of gasoline cargo tanks have occurred or, alternatively, shall record the operating parameter data only during such loadings. The date and time of day shall also be indicated at reasonable intervals on this record.

(2) Record and report simultaneously with the notification of compliance status required under § 63.9(h):

(i) All data and calculations, engineering assessments, and manufacturer's recommendations used in determining the operating parameter value under § 63.425(b); and

(ii) The following information when using a flare under provisions of § 63.11(b) to comply with § 63.422(b):

(A) Flare design (i.e., steam-assisted, air-assisted, or non-assisted); and

(B) All visible emissions readings, heat content determinations, flow rate measurements, and exit velocity determinations made during the compliance determination required under § 63.425(a).

(3) If an owner or operator requests approval to use a vapor processing system or monitor an operating parameter other than those specified in § 63.427(a), the owner or operator shall submit a description of planned reporting and recordkeeping procedures. The Administrator will specify appropriate reporting and recordkeeping requirements as part of the review of the permit application.

TLO will keep the records listed above and submit descriptions of planned reporting and recordkeeping procedures as needed.

(d) Each owner or operator of storage vessels subject to the provisions of this subpart shall keep records and furnish reports as specified in § 60.115b of this chapter, except records shall be kept for at least 5 years.

TLO shall keep records and submit reports in accordance with §60.115b.

(e) Each owner or operator complying with the provisions of § 63.424 (a) through (d) shall record the following information in the log book for each leak that is detected:

(1) The equipment type and identification number;

(2) The nature of the leak (i.e., vapor or liquid) and the method of detection (i.e., sight, sound, or smell);

(3) The date the leak was detected and the date of each attempt to repair the leak;

(4) Repair methods applied in each attempt to repair the leak;

(5) “Repair delayed” and the reason for the delay if the leak is not repaired within 15 calendar days after discovery of the leak;

(6) The expected date of successful repair of the leak if the leak is not repaired within 15 days; and

(7) The date of successful repair of the leak.

TLO will keep the records listed above.

(f) Each owner or operator subject to the provisions of § 63.424 shall report to the Administrator a description of the types, identification numbers, and locations of all equipment in gasoline service. For facilities electing to implement an instrument program under § 63.424(f), the report shall contain a full description of the program.

(1) In the case of an existing source or a new source that has an initial startup date before the effective date, the report shall be submitted with the notification of compliance status required under § 63.9(h), unless an extension of compliance is granted under § 63.6(i). If an extension of compliance is granted, the report shall be submitted on a date scheduled by the Administrator.

(2) In the case of new sources that did not have an initial startup date before the effective date, the report shall be submitted with the application for approval of construction, as described in § 63.5(d).

TLO will report the above information.

(g) Each owner or operator of a bulk gasoline terminal or pipeline breakout station subject to the provisions of this subpart shall include in a semiannual report to the Administrator the following information, as applicable:
   (1) Each loading of a gasoline cargo tank for which vapor tightness documentation had not been previously obtained by the facility;
   (2) Periodic reports required under paragraph (d) of this section; and
   (3) The number of equipment leaks not repaired within 5 days after detection.

TLO will report the above information on a semiannual basis.

(h) Each owner or operator of a bulk gasoline terminal or pipeline breakout station subject to the provisions of this subpart shall submit an excess emissions report to the Administrator in accordance with § 63.10(e)(3), whether or not a CMS is installed at the facility. The following occurrences are excess emissions events under this subpart, and the following information shall be included in the excess emissions report, as applicable:
   (1) Each exceedance or failure to maintain, as appropriate, the monitored operating parameter value determined under § 63.425(b). The report shall include the monitoring data for the days on which exceedances or failures to maintain have occurred, and a description and timing of the steps taken to repair or perform maintenance on the vapor collection and processing systems or the CMS.
   (2) Each instance of a nonvapor-tight gasoline cargo tank loading at the facility in which the owner or operator failed to take steps to assure that such cargo tank would not be reloaded at the facility before vapor tightness documentation for that cargo tank was obtained.
   (3) Each reloading of a nonvapor-tight gasoline cargo tank at the facility before vapor tightness documentation for that cargo tank is obtained by the facility in accordance with § 63.422(c)(2).
   (4) For each occurrence of an equipment leak for which no repair attempt was made within 5 days or for which repair was not completed within 15 days after detection:
      (i) The date on which the leak was detected;
      (iii) The date of each attempt to repair the leak;
      (iv) The reasons for the delay of repair; and
      (v) The date of successful repair.

TLO will report the above information as applicable.

(i) Each owner or operator of a facility meeting the criteria in § 63.420(c) shall perform the requirements of this paragraph (i), all of which will be available for public inspection:
   (1) Document and report to the Administrator not later than December 16, 1996 for existing facilities, within 30 days for existing facilities subject to § 63.420(c) after December 16, 1996, or at startup for new facilities the methods, procedures, and assumptions supporting the calculations for determining criteria in § 63.420(c);
   (2) Maintain records to document that the facility parameters established under § 63.420(c) have not been exceeded; and
   (3) Report annually to the Administrator that the facility parameters established under § 63.420(c) have not been exceeded.
   (4) At any time following the notification required under paragraph (i)(1) of this section and approval by the Administrator of the facility parameters, and prior to any of the parameters being exceeded, the owner or operator may submit a report to request modification of any facility parameter to the Administrator for approval. Each such request shall document any expected HAP emission change resulting from the change in parameter.

TLO is not subject to §63.420(c) and thus is not subject to this section. The Terminal is subject to Subpart R and is not required to maintain records of exemptions from Subpart R.

(j) Each owner or operator of a facility meeting the criteria in § 63.420(d) shall perform the requirements of this paragraph (j), all of which will be available for public inspection:
  (1) Document and report to the Administrator not later than December 16, 1996 for existing facilities, within 30 days for existing facilities subject to § 63.420(d) after December 16, 1996, or at startup for new facilities the use of the emission screening equations in § 63.420(a)(1) or (b)(1) and the calculated value of E_T or E_P ;
  (2) Maintain a record of the calculations in § 63.420 (a)(1) or (b)(1), including methods, procedures, and assumptions supporting the calculations for determining criteria in § 63.420(d); and
  (3) At any time following the notification required under paragraph (j)(1) of this section, and prior to any of the parameters being exceeded, the owner or operator may notify the Administrator of modifications to the facility parameters. Each such notification shall document any expected HAP emission change resulting from the change in parameter.

TLO is not subject to §63.420(d) and thus is not subject to this section. The Terminal is subject to Subpart R and is not required to maintain records of exemptions from Subpart R.

(k) As an alternative to keeping records at the terminal of each gasoline cargo tank test result as required in paragraph (b) of this section, an owner or operator may comply with the requirements in either paragraph (k)(1) or (2) of this section.
  (1) An electronic copy of each record is instantly available at the terminal.
    (i) The copy of each record in paragraph (k)(1) of this section is an exact duplicate image of the original paper record with certifying signatures.
    (ii) The permitting authority is notified in writing that each terminal using this alternative is in compliance with paragraph (k)(1) of this section.
  (2) For facilities that utilize a terminal automation system to prevent gasoline cargo tanks that do not have valid cargo tank vapor tightness documentation from loading (e.g., via a card lock-out system), a copy of the documentation is made available (e.g., via facsimile) for inspection by permitting authority representatives during the course of a site visit, or within a mutually agreeable time frame.
    (i) The copy of each record in paragraph (k)(2) of this section is an exact duplicate image of the original paper record with certifying signatures.
    (ii) The permitting authority is notified in writing that each terminal using this alternative is in compliance with paragraph (k)(2) of this section.

TLO is aware of the alternative recordkeeping methods.

[59 FR 64318, Dec. 14, 1994, as amended at 61 FR 7723, Feb. 29, 1996; 62 FR 9093, Feb. 28, 1997; 68 FR 70966, Dec. 19, 2003; 71 FR 17358, Apr. 6, 2006]

§ 63.429 Implementation and enforcement.

(a) This subpart can be implemented and enforced by the U.S. EPA, or a delegated authority such as the applicable State, local, or Tribal agency. If the U.S. EPA Administrator has delegated authority to a State, local, or Tribal agency, then that agency, in addition to the U.S. EPA, has the authority to implement and enforce this subpart. Contact the applicable U.S. EPA Regional Office to find out if implementation and enforcement of this subpart is delegated to a State, local, or Tribal agency.
(b) In delegating implementation and enforcement authority of this subpart to a State, local, or Tribal agency under subpart E of this part, the authorities contained in paragraph (c) of this

section are retained by the Administrator of U.S. EPA and cannot be transferred to the State, local, or Tribal agency.

(c) The authorities that cannot be delegated to State, local, or Tribal agencies are as specified in paragraphs (c)(1) through (4) of this section.

(4) Approval of alternatives to the requirements in §§ 63.420, 63.422 through 63.423, and 63.424. Any owner or operator requesting to use an alternative means of emission limitation for storage vessels covered by § 63.423 must follow the procedures in § 63.426.

(5) Approval of major alternatives to test methods under § 63.7(e)(2)(ii) and (f), as defined in § 63.90, and as required in this subpart.

(6) Approval of major alternatives to monitoring under § 63.8(f), as defined in § 63.90, and as required in this subpart, and any alternatives to § 63.427(a)(1) through (4) per § 63.427(a)(5).\

(7) Approval of major alternatives to recordkeeping and reporting under § 63.10(f), as defined in § 63.90, and as required in this subpart.

These provisions are applicable to regulatory agencies and not to TLO or the Terminal.

[68 FR 37348, June 23, 2003]

For reference, TLO has here reproduced Appendix C of the current Tier II permit, showing the general applicability of Part 63 Subpart A, "General Provisions," to Subpart R at the Terminal.

Table 1 to Subpart R of Part 63—General Provisions Applicability to Subpart R

Reference	Applies to subpart R	Comment
63.1(a)(1)	Yes	
63.1(a)(2)	Yes	
63.1(a)(3)	Yes	
63.1(a)(4)	Yes	
63.1(a)(5)	No	Section reserved
63.1(a)(6)(8)	Yes	
63.1(a)(9)	No	Section reserved
63.1(a)(10)	Yes	
63.1(a)(11)	Yes	
63.1(a)(12))-(a)(14)	Yes	
63.1(b)(1)	No	Subpart R specifies applicability in § 63.420
63.1(b)(2)	Yes	

63.1(b)(3)	No	Subpart R specifies reporting and recordkeeping for some large area sources in § 63.428
63.1(c)(1)	Yes	
63.1(c)(2)	Yes	Some small sources are not subject to subpart R
63.1(c)(3)	No	Section reserved
63.1(c)(4)	Yes	
63.1(c)(5)	Yes	
63.1(d)	No	Section reserved
63.1(e)	Yes	
63.2	Yes	Additional definitions in § 63.421
63.3(a)-(c)	Yes	
63.4(a)(1)-(a)(3)	Yes	
63.4(a)(4)	No	Section reserved
63.4(a)(5)	Yes	
63.4(b)	Yes	
63.4(c)	Yes	
63.5(a)(1)	Yes	
63.5(a)(2)	Yes	
63.5(b)(1)	Yes	
63.5(b)(2)	No	Section reserved
63.5(b)(3)	Yes	
63.5(b)(4)	Yes	
63.5(b)(5)	Yes	
63.5(b)(6)	Yes	
63.5(c)	No	Section reserved
63.5(d)(1)	Yes	
63.5(d)(2)	Yes	
63.5(d)(3)	Yes	
63.5(d)(4)	Yes	
63.5(e)	Yes	

63.5(f)(1)	Yes	
63.5(f)(2)	Yes	
63.6(a)	Yes	
63.6(b)(1)	Yes	
63.6(b)(2)	Yes	
63.6(b)(3)	Yes	
63.6(b)(4)	Yes	
63.6(b)(5)	Yes	
63.6(b)(6)	No	Section reserved
63.6(b)(7)	Yes	
63.6(c)(1)	No	Subpart R specifies the compliance date
63.6(c)(2)	Yes	
63.6(c)(3)-(c)(4)	No	Sections reserved
63.6(c)(5)	Yes	
63.6(d)	No	Section reserved
63.6(e)	Yes	
63.6(f)(1)	Yes	
63.6(f)(2)	Yes	
63.6(f)(3)	Yes	
63.6(g)	Yes	
63.6(h)	No	Subpart R does not require COMS
63.6(i)(1)-(i)(14)	Yes	
63.6(i)(15)	No	Section reserved
63.6(i)(16)	Yes	
63.6(j)	Yes	
63.7(a)(1)	Yes	
63.7(a)(2)	Yes	
63.7(a)(3)	Yes	
63.7(b)	Yes	

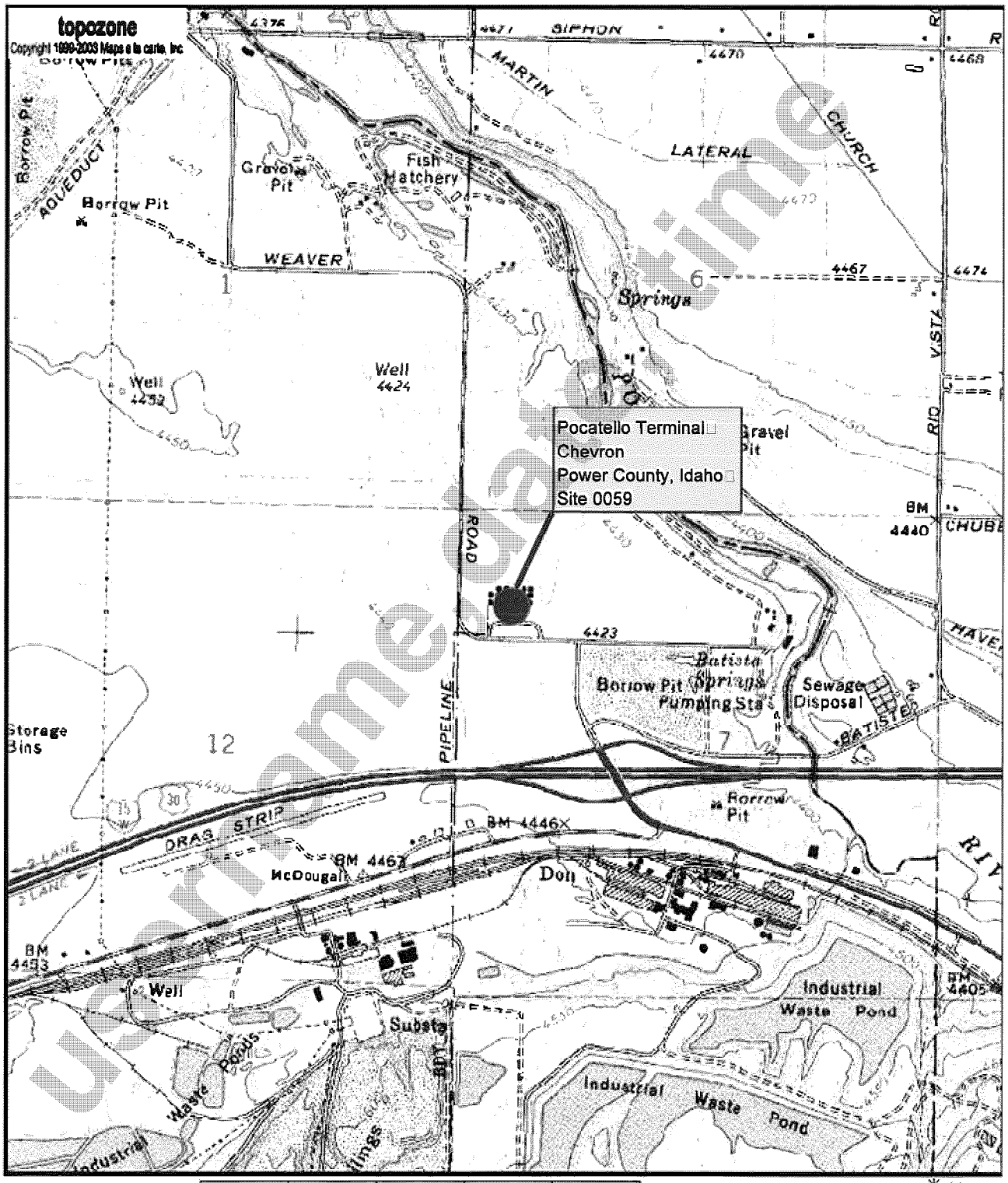
63.7(c)	Yes	
63.7(d)	Yes	
63.7(e)(1)	Yes	
63.7(e)(2)	Yes	
63.7(e)(3)	Yes	
63.7(e)(4)	Yes	
63.7(f)	Yes	
63.7(g)	Yes	
63.7(h)	Yes	
63.8(a)(1)	Yes	
63.8(a)(2)	Yes	
63.8(a)(3)	No	Section reserved
63.8(a)(4)	Yes	
63.8(b)(1)	Yes	
63.8(b)(2)	Yes	
63.8(b)(3)	Yes	
63.8(c)(1)	Yes	
63.8(c)(2)	Yes	
63.8(c)(3)	Yes	
63.8(c)(4)	Yes	
63.8(c)(5)	No	Subpart R does not require COMS
63.8(c)(6)-(c)(8)	Yes	
63.8(d)	Yes	
63.8(e)	Yes	
63.8(f)(1)-(f)(5)	Yes	
63.8(f)(6)	Yes	
63.8(g)	Yes	
63.9(a)	Yes	
63.9(b)(1)	Yes	

63.9(b)(2)	No	Subpart R allows additional time for existing sources to submit initial notification. Sec. 63.428(a) specifies submittal by 1 year after being subject to the rule or December 16, 1996, whichever is later.
63.9(b)(3)	Yes	
63.9(b)(4)	Yes	
63.9(b)(5)	Yes	
63.9(c)	Yes	
63.9(d)	Yes	
63.9(e)	Yes	
63.9(f)	Yes	
63.9(g)	Yes	
63.9(h)(1)-(h)(3)	Yes	
63.9(h)(4)	No	Section reserved
63.9(h)(5)-(h)(6)	Yes	
63.9(i)	Yes	
63.9(j)	Yes	
63.10(a)	Yes	
63.10(b)(1)	Yes	
63.10(b)(2)	Yes	
63.10(b)(3)	Yes	
63.10(c)(1)	Yes	
63.10(c)(2)-(c)(4)	No	Sections reserved
63.10(c)(5)-(c)(8)	Yes	
63.10(c)(9)	No	Section reserved
63.10(c)(5)-(c)(8)	Yes	
63.10(d)(1)	Yes	
63.10(d)(2)	Yes	

63.10(d)(3)	Yes	
63.10(d)(4)	Yes	
63.10(d)(5)	Yes	
63.10(e)	Yes	
63.10(f)	Yes	
63.11(a)-(b)	Yes	
63.11(c), (d), and (e)	Yes	
63.12(a)-(c)	Yes	
63.13(a)-(c)	Yes	
63.14(a)-(b)	Yes	
63.15(a)-(b)	Yes	

[59 FR 64318, Dec. 14, 1994, as amended at 61 FR 7724, Feb. 29, 1996; 73 FR 78213, Dec. 22, 2008]

TLO will continue to comply with the above sections of NESHAP general provisions.

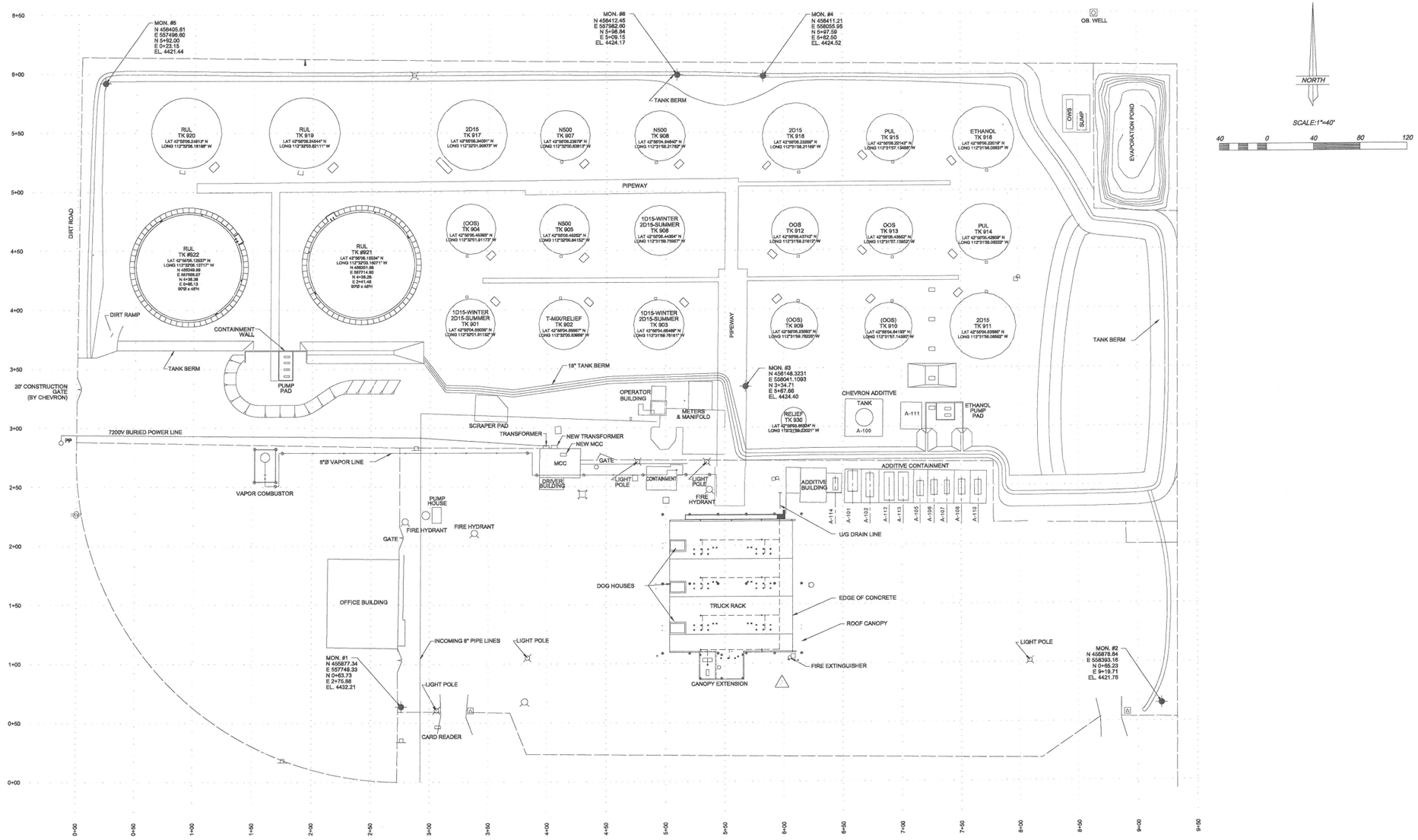


Map center is 42.9179°N, 112.5337°W (WGS84/NAD83)
Michaud quadrangle
Projection is UTM Zone 12 NAD83 Datum

M=14.044
G=-1.045

07/27/2004

SITE LOCATION MAP



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REFERENCE DRAWINGS

DRAWING NO.	DRAWING TITLE	DRAWING NO.	DRAWING TITLE

REVISIONS

REV	DESCRIPTION OF REVISION	DATE	BY	CHK	APP	REV	DESCRIPTION OF REVISION	DATE	BY	CHK	APP
						0	ISSUED FOR CLIENT CHANGE	11/19/13	GWH	JTJ	

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DRAWN BY	S.HAMBLIN	12/01/00
CHECKED BY	W.EVANS	12/01/00
APPROVED BY		
DATE	11/19/13	
SCALE	AS NOTED	

PLOT PLAN
POCATELLO TERMINAL
POCATELLO TERMINAL, POWER, ID
ETHANOL BLENDING PROJECT
SHEET 1 OF 1

DRAWING NO. IDF038-A-00792
REV. 0

C:\Users\w644507\AppData\Local\Microsoft\Windows\Temporary Internet Files\Content.Outlook\CQBMPLI9\IDF038A00792.dwg Dec 05, 2013 10:23am

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

Prepared For

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August 6, 1993

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JOHN ZINK COMPANY
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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

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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-inspirating 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.

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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.).

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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.

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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]	---	5.12	---	---
Truck Rack VCU Stack Emissions [c]	9.43	15.72	23.56	795.92
TOTAL	**9.43**	**45.03**	**23.56**	**795.92**
TOTAL TRUCK RACK FUGITIVE AND VCU STACK EMISSIONS	**9.43**	**20.84**	**23.56**	**795.92**
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	1.87E-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	4.90E-02	0.0E+00	1.95E-02	0.22	0.06	--
Benzene	71-43-2	1.24E-01	2.06E-02	6.33E-02	9.5E-07	4.48E-03	0.21	0.08	--
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	4.07E-03	0.0E+00	7.89E-03	0.09	0.01	--
Hexane (-n)	110-54-3	2.49E-01	3.63E-02	1.20E-01	8.1E-04	8.70E-02	0.49	0.16	YES
Isopropyl benzene (cumene)	98-82-8	6.46E-02	1.01E-04	3.54E-04	0.0E+00	2.79E-03	0.07	0.00	--
Methyl alcohol	67-56-1	6.88E-02	2.68E-03	8.21E-03	0.0E+00	5.81E-04	0.08	0.01	--
Naphthalene	91-20-3	6.34E-02	1.74E-05	7.61E-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	2.12E-04	0.0E+00	1.50E-05	0.06	0.00	--
Toluene	108-88-3	1.99E-01	2.28E-02	7.07E-02	1.5E-06	4.36E-02	0.34	0.09	--
Xylenes	1330-20-7	1.34E-01	8.14E-03	2.56E-02	0.0E+00	3.99E-02	0.21	0.03	--
Additional HAP (tpy) [g] from Natural Gas Combustion									
2-Methylnaphthalene	91-57-6	--	--	1.01E-07	1.1E-08	--	1.11E-07	0.00	--
3-Methylchloranthrene	56-49-5	--	--	7.55E-09	8.1E-10	--	8.36E-09	0.00	--
7,12-Dimethylbenz(a)anthracene	57-97-6	--	--	6.71E-08	7.2E-09	--	7.43E-08	0.00	--
Acenaphthene	83-32-9	--	--	7.55E-09	8.1E-10	--	8.36E-09	0.00	--
Acenaphthylene	203-96-8	--	--	7.55E-09	8.1E-10	--	8.36E-09	0.00	--
Anthracene	120-12-7	--	--	1.01E-08	1.1E-09	--	1.11E-08	0.00	--
Benz(a)anthracene	56-55-3	--	--	7.55E-09	8.1E-10	--	8.36E-09	0.00	--
Benzo(a)pyrene	50-32-8	--	--	5.03E-09	5.4E-10	--	5.57E-09	0.00	--
Benzo(b)fluoranthene	205-99-2	--	--	7.55E-09	8.1E-10	--	8.36E-09	0.00	--
Benzo(g,h,i)perylene	191-24-2	--	--	5.03E-09	5.4E-10	--	5.57E-09	0.00	--
Benzo(k)fluoranthene	205-82-3	--	--	7.55E-09	8.1E-10	--	8.36E-09	0.00	--
Chrysene	218-01-9	--	--	7.55E-09	8.1E-10	--	8.36E-09	0.00	--
Dibenzo(a,h)anthracene	53-70-3	--	--	5.03E-09	5.4E-10	--	5.57E-09	0.00	--
Dichlorobenzene	25321-22-6	--	--	5.03E-06	5.4E-07	--	5.57E-06	0.00	--
Fluoranthene	206-44-0	--	--	1.26E-08	1.4E-09	--	1.39E-08	0.00	--
Fluorene	86-73-7	--	--	1.17E-08	1.3E-09	--	1.30E-08	0.00	--
Formaldehyde	50-00-0	--	--	3.14E-04	3.4E-05	--	3.48E-04	0.00	--
Indeno(1,2,3-cd)pyrene	193-39-5	--	--	7.55E-09	8.1E-10	--	8.36E-09	0.00	--
Phenanathrene	85-01-8	--	--	7.13E-08	7.7E-09	--	7.89E-08	0.00	--
Pyrene	129-00-0	--	--	2.10E-08	2.3E-09	--	2.32E-08	0.00	--
Arsenic	7440-38-2	--	--	8.38E-07	9.0E-08	--	9.29E-07	0.00	--
Beryllium	7440-41-7	--	--	5.03E-08	5.4E-09	--	5.57E-08	0.00	--
Cadmium	7440-43-9	--	--	4.61E-06	5.0E-07	--	5.11E-06	0.00	--
Chromium	7440-47-3	--	--	5.87E-06	6.3E-07	--	6.50E-06	0.00	--
Cobalt	7440-48-4	--	--	3.52E-07	3.8E-08	--	3.90E-07	0.00	--
Manganese	7439-96-5	--	--	1.59E-06	1.7E-07	--	1.76E-06	0.00	--
Mercury	7439-97-6	--	--	1.09E-06	1.2E-07	--	1.21E-06	0.00	--
Nickel	7440-02-0	--	--	8.80E-06	9.5E-07	--	9.75E-06	0.00	--
Selenium	7782-49-2	--	--	1.01E-07	1.1E-08	--	1.11E-07	0.00	--
Total		**1.38**	**0.11**	**0.34**	**0.00**	**0.22**	**2.06**	**0.45**	--
Total HAP		**1.30**	**0.11**	**0.34**	**8.51E-04**	**0.21**	**1.96**	**0.45**	--
GHG (tpy CO_2e)		--	--	**742.11**	**53.81**	--	**795.92**	**1,591.85**	--

[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-Trimethyl pentane (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	0.06	0.07	0.06	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]	0.05	0.06	0.00	0.00	0.00	0.11	0.00	0.01	0.00	0.00	0.00	0.07	0.03	0.33
TOTAL	**0.22**	**0.21**	**0.06**	**0.06**	**0.09**	**0.49**	**0.07**	**0.08**	**0.06**	**0.00**	**0.06**	**0.34**	**0.21**	**1.95**

[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 (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	3.9	5.6
Total	100%	100%	100%						
Estimated Transmix Properties [b]					129	60		2.39	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.

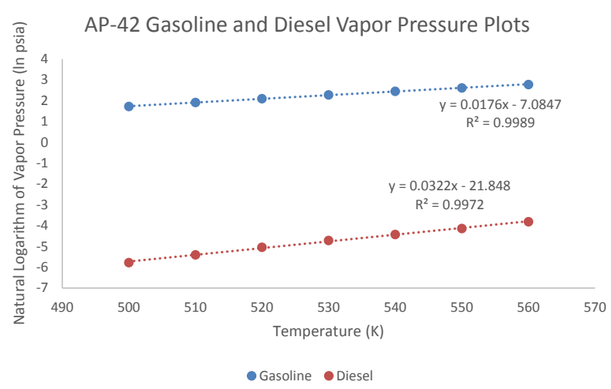


Table C-3d. Vapor Pressure Data

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	3.88	0.0039	2.39
70.55	530.55	21.60	6.08	0.0085	3.76

[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-7. Loading Rack and VCU - Annual Emissions of VOC, CO, and NOx

Product	Quantity Loaded (Mgal/yr)	VOC Emission Factor (mg/L)	VOC Emission Factor (lb/Mgal)	VOC Emissions (tpy)	CO Emission Factor (mg/L) [f]	CO Emission Factor (lb/Mgal) [f]	CO Emissions (tpy)	NO_x Emission Factor (mg/L) [f]	NO_x Emission Factor (lb/Mgal) [f]	NO_x Emissions (tpy)
Gasoline [a,b,c]	370,801	10	0.08	15.47	10.00	0.08	15.47	4.00	0.03	6.19
Diesel [a]	191,453		3.73E-04	0.04	10.00	0.08	7.99	4.00	0.03	3.20
Transmix [a,d]	2,520		0.17	0.21	10.00	0.08	0.11	4.00	0.03	0.04
			Total Stack Emissions:	**15.72**			**23.56**			**9.43**
Fugitive Vapor Leakage from Gasoline [e]	370,801		0.03	5.09						
Fugitive Vapor Leakage from Diesel [e]	191,453		0.00	0.01						
Fugitive Vapor Leakage from Transmix [e]	2,520		0.02	0.02						
			Total Fugitive Emissions:	**5.12**						

[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-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)
$P_{Gasoline\ RVP15}$ =	3.88	(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)
$P_{Transmix}$ =	2.39	(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-Collection Eff./100)*$EF_{Uncontrolled}$

$EF_{Uncontrolled}$=	3.43	(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
$EF_{Uncontrolled}$=	2.12	(lb/Mgal) Uncontrolled Organic Emission Factor for Transmix
Control Eff.	99.2%	

[f] Emission factors for CO and NO_X are based on the emission factors guaranteed by the vendor and submitted in previous Tier II permit applications.

Table C-8a. Speciated Liquid Weight Percents a

Species CAS No. Product	1,2,4-Trimethyl benzene 95-63-6 (wt%)	2,2,4-Trimethyl pentane 540-84-1 (wt%)	Benzene 71-43-2 (wt%)	Biphenyl 92-52-4 (wt%)	Cresol 1319-77-3 (wt%)	Ethyl benzene 100-41-4 (wt%)	Hexane (-n) 110-54-3 (wt%)	Isopropyl benzene (cumene) 98-82-8 (wt%)	Methanol 67-56-1 (wt%)	Naphthalene 91-20-3 (wt%)	Phenol 108-95-2 (wt%)	Styrene 100-42-5 (wt%)	Toluene 108-88-3 (wt%)	Xylenes 1330-20-7 (wt%)	Total (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 (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-8d. Vapor Speciation Calculations

	Mixture Properties [a]			Vapor Weight Fraction Calculations (Zi,V) [f]														
				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	Total
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	
	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	3.88	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	4.85E-05	1.62E-03	3.10E-03	0.00E+00	0.00E+00	1.37E-04	4.88E-03	8.39E-06	9.80E-04	9.97E-07	0.00E+00	7.78E-06	2.88E-03	8.76E-04	
			Zi,V	9.72E-05	3.08E-03	4.04E-03	0.00E+00	0.00E+00	2.43E-04	7.02E-03	1.68E-05	5.23E-04	2.13E-06	0.00E+00	1.35E-05	4.42E-03	1.55E-03	0.021
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	
	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	0.00392	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	8.54E-08	1.49E-04	8.71E-03	1.18E-01	2.72E-03	0.00E+00	1.13E-03	1.78E-03	0.00E+00	5.54E-02	4.40E-02	
			Zi,V	9.64E-03	1.76E-02	0.00E+00	1.01E-07	1.24E-04	7.11E-03	7.84E-02	2.51E-03	0.00E+00	1.12E-03	1.29E-03	0.00E+00	3.93E-02	3.59E-02	0.193
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	
	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	2.39	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	5.50E-05	1.63E-03	3.10E-03	5.35E-11	9.36E-08	1.43E-04	4.96E-03	1.01E-05	9.79E-04	1.71E-06	1.11E-06	7.78E-06	2.91E-03	9.03E-04	
			Zi,V	1.10E-04	3.10E-03	4.03E-03	1.37E-10	1.69E-07	2.52E-04	7.11E-03	2.02E-05	5.23E-04	3.64E-06	1.75E-06	1.35E-05	4.46E-03	1.60E-03	0.021

[a] Mixture property nomenclature:

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

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

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

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

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)

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

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

Zi,L = weight fraction of component i in the liquid, lb/lb

Zi,V = weight fraction of component i in the vapor, lb/lb

[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 (Zi,V) for each species in each product are calculated using the following method based on AP-42 Section 7.1:

xi = ((Zi,L)(ML))/Mi

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

Pi = (P)(xi)

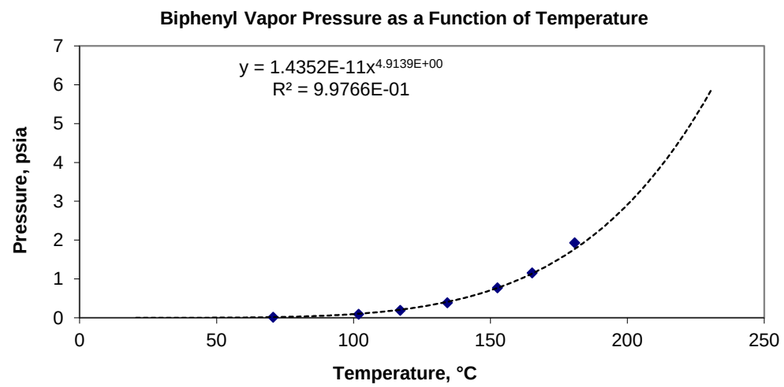
yi = Pi/PVA

Zi,V = ((yi)(Mi))/MV = (10^(A - (B/(TLA + C)))(0.0193368)(Zi.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 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. Product	1,2,4-Trimethyl benzene 95-63-6 (wt%)	2,2,4-Trimethyl pentane 540-84-1 (wt%)	Benzene 71-43-2 (wt%)	Biphenyl 92-52-4 (wt%)	Cresol 1319-77-3 (wt%)	Ethyl benzene 100-41-4 (wt%)	Hexane (-n) 110-54-3 (wt%)	Isopropyl benzene (cumene) 98-82-8 (wt%)	Methanol 67-56-1 (wt%)	Naphthalene 91-20-3 (wt%)	Phenol 108-95-2 (wt%)	Styrene 100-42-5 (wt%)	Toluene 108-88-3 (wt%)	Xylenes 1330-20-7 (wt%)	Total (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 (Zi,V) [f]													
				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	Total
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	
	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	6.08	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	8.23E-05	2.09E-03	3.89E-03	0.00E+00	0.00E+00	2.05E-04	5.87E-03	1.34E-05	1.35E-03	1.85E-06	0.00E+00	1.17E-05	3.92E-03	1.29E-03	
			Zi,V	1.65E-04	3.97E-03	5.06E-03	0.00E+00	0.00E+00	3.62E-04	8.44E-03	2.67E-05	7.19E-04	3.95E-06	0.00E+00	2.03E-05	6.02E-03	2.28E-03	0.027
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	
	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	0.00854	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	1.85E-02	0.00E+00	5.04E-06	2.41E-04	9.34E-03	1.02E-01	3.11E-03	0.00E+00	1.51E-03	3.02E-03	0.00E+00	5.44E-02	4.66E-02	
			Zi,V	1.18E-02	1.63E-02	0.00E+00	5.97E-06	2.01E-04	7.63E-03	6.78E-02	2.88E-03	0.00E+00	1.49E-03	2.18E-03	0.00E+00	3.85E-02	3.81E-02	0.187
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	
	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	3.76	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	9.33E-05	2.10E-03	3.88E-03	4.38E-09	2.10E-07	2.13E-04	5.96E-03	1.60E-05	1.35E-03	3.16E-06	2.62E-06	1.17E-05	3.96E-03	1.33E-03	
			Zi,V	1.87E-04	3.99E-03	5.05E-03	1.13E-08	3.78E-07	3.76E-04	8.55E-03	3.21E-05	7.18E-04	6.74E-06	4.11E-06	2.02E-05	6.08E-03	2.35E-03	0.027

[a] Mixture property nomenclature:

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

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

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

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

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)

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

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

Zi,L = weight fraction of component i in the liquid, lb/lb

Zi,V = weight fraction of component i in the vapor, lb/lb

[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 (Zi,V) for each species in each product are calculated using the following method based on AP-42 Section 7.1:

xi = ((Zi,L)(ML))/Mi

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

Pi = (P)(xi)

yi = Pi/PVA

Zi,V = ((yi)(Mi))/MV = (10^(A - (B/(TLA + C)))(0.0193368)(Zi.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)	Speciated Emissions (tpy)																
		Species CAS No. HAP?	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	HAP Total 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		5.06E-03	9.24E-03	2.12E-03	5.32E-08	6.53E-05	0.00E+00	3.74E-03	4.12E-02	1.32E-03	2.75E-04	5.87E-04	6.76E-04	7.10E-06	2.06E-02	1.89E-02	0.10
Valves Vapor	0.00		3.99E-05	7.29E-05	1.67E-05	4.20E-10	5.15E-07	0.00E+00	2.95E-05	3.25E-04	1.04E-05	2.17E-06	4.63E-06	5.33E-06	5.60E-08	1.63E-04	1.49E-04	0.00
Fittings Liquid	0.10		9.42E-04	1.72E-03	3.94E-04	9.91E-09	1.22E-05	0.00E+00	6.95E-04	7.66E-03	2.45E-04	5.11E-05	1.09E-04	1.26E-04	1.32E-06	3.84E-03	3.51E-03	0.02
Fittings Vapor	0.04		4.30E-04	7.85E-04	1.80E-04	4.52E-09	5.55E-06	0.00E+00	3.17E-04	3.50E-03	1.12E-04	2.33E-05	4.98E-05	5.74E-05	6.03E-07	1.75E-03	1.60E-03	0.01
Pump Seals Liquid	0.32		3.04E-03	5.55E-03	1.27E-03	3.20E-08	3.92E-05	0.00E+00	2.24E-03	2.47E-02	7.92E-04	1.65E-04	3.52E-04	4.06E-04	4.26E-06	1.24E-02	1.13E-02	0.06
Others Liquid	0.12		1.18E-03	2.16E-03	4.96E-04	1.25E-08	1.53E-05	0.00E+00	8.74E-04	9.63E-03	3.09E-04	6.43E-05	1.37E-04	1.58E-04	1.66E-06	4.83E-03	4.42E-03	0.02
TOTAL	1.11		1.07E-02	1.95E-02	4.48E-03	1.13E-07	1.38E-04	0.00E+00	7.89E-03	8.70E-02	2.79E-03	5.81E-04	1.24E-03	1.43E-03	1.50E-05	4.36E-02	3.99E-02	0.21
Truck Loading Losses [c]																		
Gasoline	5.09		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	0.02		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	5.12		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		1.50E-03	4.77E-02	6.24E-02	0.00E+00	0.00E+00	0.00E+00	3.76E-03	1.09E-01	2.60E-04	8.10E-03	3.30E-05	0.00E+00	2.09E-04	6.83E-02	2.40E-02	0.32
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	0.21		2.36E-05	6.66E-04	8.65E-04	2.95E-11	3.62E-08	0.00E+00	5.42E-05	1.53E-03	4.33E-06	1.12E-04	7.82E-07	3.75E-07	2.90E-06	9.58E-04	3.43E-04	0.00
TOTAL	15.72		1.87E-03	4.90E-02	6.33E-02	3.65E-09	4.47E-06	0.00E+00	4.07E-03	1.13E-01	3.54E-04	8.21E-03	7.36E-05	4.63E-05	2.12E-04	7.07E-02	2.56E-02	0.33
TOTAL FACILITY EMISSIONS	**45.03**		**9.95E-02**	**2.19E-01**	**2.12E-01**	**6.05E-02**	**6.07E-02**	**2.37E-01**	**9.10E-02**	**4.86E-01**	**6.79E-02**	**8.02E-02**	**6.47E-02**	**1.48E-03**	**6.12E-02**	**3.36E-01**	**2.07E-01**	**1.95**

[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	9.72E-05	3.08E-03	4.04E-03				2.43E-04	7.02E-03	1.68E-05	5.23E-04	2.13E-06		1.35E-05	4.42E-03	1.55E-03
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	9.64E-03	1.76E-02		1.01E-07	1.24E-04		7.11E-03	7.84E-02	2.51E-03		1.12E-03	1.29E-03		3.93E-02	3.59E-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	1.10E-04	3.10E-03	4.03E-03	1.37E-10	1.69E-07		2.52E-04	7.11E-03	2.02E-05	5.23E-04	3.64E-06	1.75E-06	1.35E-05	4.46E-03	1.60E-03
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]	9.64E-03	1.76E-02	4.04E-03	1.01E-07	1.24E-04		7.11E-03	7.84E-02	2.51E-03	5.23E-04	1.12E-03	1.29E-03	1.35E-05	3.93E-02	3.59E-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_2O Emission Factor [d] (kg/MMBtu)	N_2O Emission Rate (kg/yr)	Total Emission Rate [e] (kg/yr CO_2e)	(tpy CO_2e)
VCU Stack													
Gasoline	636.83	60	7.85	1,388	10,891	59.00	6.43E+05	1.00E-03	1.09E+01	1.00E-04	1.09E+00	6.43E+05	708.93
Diesel	0.72	130	0.00	1,388	6	59.00	3.35E+02	1.00E-03	5.68E-03	1.00E-04	5.68E-04	3.35E+02	0.37
Transmix	2.67	60	0.03	1,388	46	59.00	2.70E+03	1.00E-03	4.57E-02	1.00E-04	4.57E-03	2.70E+03	2.98
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			**8.38**		**12,372**		7.21E+05		1.24E+01		1.24E+00	**7.22E+05**	**795.92**

[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	3.43	370,801
Diesel	0.008	191,453
Transmix	2.12	2,520

[b] VOC fuel consumption at the loading rack in MMscf is calculated according to the following formula:
(VOC captured, tpy) * (2000 lb/ton) / (molar mass, lb/lbmol) * (0.73 scf atm/lbmol °R) (loading temperature, °R) / (1 atm) * (1 MMscf/1,000,000 scf) = (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] CO_2 emission factor for fuel gas obtained from Table C-1 in 40 CFR 98 Subpart C. Table C-2 does not list CH_4 and N_2O 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.
Emission rate, kg/yr CO_2e = (CO_2 emission rate, kg/yr) * (1 kg CO_2e / kg CO_2) + (CH_4 emission rate, kg/yr) * (21 kg CO_2e / kg CH_4) + (N_2O emission rate, kg/yr) * (310 kg CO_2e / kg N_2O)
Conversions to CO_2e are found in Table A-1 in 40 CFR 98 Subpart C, which gives the 100-year global warming potentials for each species using CO_2 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	636.83	60	7.85
Diesel	0.72	130	0.00
Transmix	2.67	60	0.03
VCU Pilot [c]			0.50
Total			8.38
Other Combustion Sources			
Space Heaters, Furnaces [d]			0.90
TOTAL			**9.29**

[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	3.43	370,801
Diesel	0.01	191,453
Transmix	2.12	2,520

[b] Vapors combusted in MMscf/yr calculated as:

(tpy VOC) * (2,000 lb/ton) * (vapor MW, in lb VOC/ lbmol VOC) * R (scf atm/lbmol °R) * Annual average temperature (°R) / 1 atm

R (Ideal Gas Constant)	0.73	scf atm/lbmol °R
Temperature	506	°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)	Furnace and Heater Emissions [d] (tpy)	Totals (tpy)
NO_X		1.70E+02	--	7.67E-02	7.67E-02
CO		2.40E+01	--	1.08E-02	1.08E-02
PM_{10}		7.60E+00	3.19E-02	3.43E-03	3.53E-02
$PM_{2.5}$		7.60E+00	3.19E-02	3.43E-03	3.53E-02
SO_2		6.00E-01	2.52E-03	2.71E-04	2.79E-03
VOC		5.50E+00	--	2.48E-03	2.48E-03
Lead		5.00E-04	2.10E-06	2.25E-07	2.32E-06
2-Methylnaphthalene	91-57-6	2.40E-05	1.01E-07	1.08E-08	1.11E-07
3-Methylchloranthrene	56-49-5	1.80E-06	7.55E-09	8.12E-10	8.36E-09
7,12-Dimethylbenz(a)anthracene	57-97-6	1.60E-05	6.71E-08	7.21E-09	7.43E-08
Acenaphthene	83-32-9	1.80E-06	7.55E-09	8.12E-10	8.36E-09
Acenaphthylene	203-96-8	1.80E-06	7.55E-09	8.12E-10	8.36E-09
Anthracene	120-12-7	2.40E-06	1.01E-08	1.08E-09	1.11E-08
Benz(a)anthracene	56-55-3	1.80E-06	7.55E-09	8.12E-10	8.36E-09
Benzene	71-43-2	2.10E-03	8.80E-06	9.47E-07	9.75E-06
Benzo(a)pyrene	50-32-8	1.20E-06	5.03E-09	5.41E-10	5.57E-09
Benzo(b)fluoranthene	205-99-2	1.80E-06	7.55E-09	8.12E-10	8.36E-09
Benzo(g,h,i)perylene	191-24-2	1.20E-06	5.03E-09	5.41E-10	5.57E-09
Benzo(k)fluoranthene	205-82-3	1.80E-06	7.55E-09	8.12E-10	8.36E-09
Chrysene	218-01-9	1.80E-06	7.55E-09	8.12E-10	8.36E-09
Dibenzo(a,h)anthracene	53-70-3	1.20E-06	5.03E-09	5.41E-10	5.57E-09
Dichlorobenzene	25321-22-6	1.20E-03	5.03E-06	5.41E-07	5.57E-06
Fluoranthene	206-44-0	3.00E-06	1.26E-08	1.35E-09	1.39E-08
Fluorene	86-73-7	2.80E-06	1.17E-08	1.26E-09	1.30E-08
Formaldehyde	50-00-0	7.50E-02	3.14E-04	3.38E-05	3.48E-04
Hexane	110-54-3	1.80E+00	7.55E-03	8.12E-04	8.36E-03
Indeno(1,2,3-cd)pyrene	193-39-5	1.80E-06	7.55E-09	8.12E-10	8.36E-09
Naphthalene	91-20-3	6.10E-04	2.56E-06	2.75E-07	2.83E-06
Phenanathrene	85-01-8	1.70E-05	7.13E-08	7.67E-09	7.89E-08
Pyrene	129-00-0	5.00E-06	2.10E-08	2.25E-09	2.32E-08
Toluene	108-88-3	3.40E-03	1.43E-05	1.53E-06	1.58E-05
Arsenic	7440-38-2	2.00E-04	8.38E-07	9.02E-08	9.29E-07
Beryllium	7440-41-7	1.20E-05	5.03E-08	5.41E-09	5.57E-08
Cadmium	7440-43-9	1.10E-03	4.61E-06	4.96E-07	5.11E-06
Chromium	7440-47-3	1.40E-03	5.87E-06	6.31E-07	6.50E-06
Cobalt	7440-48-4	8.40E-05	3.52E-07	3.79E-08	3.90E-07
Manganese	7439-96-5	3.80E-04	1.59E-06	1.71E-07	1.76E-06
Mercury	7439-97-6	2.60E-04	1.09E-06	1.17E-07	1.21E-06
Nickel	7440-02-0	2.10E-03	8.80E-06	9.47E-07	9.75E-06
Selenium	7782-49-2	2.40E-05	1.01E-07	1.08E-08	1.11E-07
TOTAL HAP		**1.89E+00**	**7.92E-03**	**8.51E-04**	**8.77E-03**

[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, and VOC are calculated for the VCU based on the factors and methods in Table C-7.

[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:	8.38 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	3.43E-03	7.52E-06	2.12E-03
Annual Average Temperature	°R	506	506	506
Maximum Daily Average Temperature	°R	530	530	530
Annual Average Vapor Pressure	psia	3.9	0.0039	2.394
Maximum Daily Average Vapor Pressure	psia	6.1	0.0085	3.756
VOC Uncontrolled Short-Term Emission Factor [a]	lb/gal	5.15E-03	1.56E-05	3.18E-03
VOC VCU Stack Short-Term Emission Factor [b]	lb/gal	8.34E-05	7.76E-07	1.58E-04
VOC Fugitive Short-Term Emission Factor [b]	lb/gal	4.12E-05	1.25E-07	2.54E-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-eff/100)
Of these terms, the vapor pressure P and the average loading temperature T vary depending on whether T is evaulated 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:

$P_{Gasoline\ RVP15}$ = 6.08
$P_{Distillate\ \#\ 2}$ = 0.0085
$P_{Transmix}$ = 3.756

[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.

Capture eff. = 99.2%
Control eff. = 95%
Emission limit = 10 mg/L

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

Product	Quantity Loaded [a] (gpm)	VOC Emission Factor [b,c] (mg/L)	VOC Emission Factor [b,c] (lb/gal)	VOC Emissions [d] (lb/hr)	Percent Hourly Uptime [a] (%, hr/hr)	Hourly Throughput [a] (gal/hr)	CO Emission Factor [e] (lb/gal)	CO Emissions [f] (lb/hr)	NO_x Emission Factor [e] (lb/gal)	NO_x Emissions [f] (lb/hr)
Gasoline	550	10	8.35E-05	2.8	75%	24,750	8.34E-05	2.07	3.34E-05	0.83
Diesel	550		7.76E-07	0.0	75%	24,750	8.34E-05	2.07	3.34E-05	0.83
Transmix	550		1.58E-04	5.2	75%	24,750	8.34E-05	2.07	3.34E-05	0.83
Total	1,650			7.99				6.20		2.48

[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 loading bays.

[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)
$P_{Gasoline\ RVP15}$ =	6.08	(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)
$P_{Transmix}$ =	3.756	(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)

[e] Emission factors for CO and NO_X from vapor combustion are based on the emission factors (10 mg CO and 4 mg NO_X per L product) guaranteed by the vendor and submitted in previous Title V applications. These factors have historically been accepted by IDEQ.

[f] Emissions of CO and NO_X from loading are calculated as: (loading rate, gal/hr) * (emission factor, lb/gal).

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	169.79	60	1.10E-03
Diesel	0.52	130	1.54E-06
Transmix	104.95	60	6.77E-04
VCU Pilot			5.71E-05
TOTAL			**1.83E-03**

[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.

$EF_{Uncontrolled}$= 5.15E-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

$EF_{Uncontrolled}$= 3.18E-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:

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

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	1.39E-02	7.82E-04
$PM_{2.5}$	--	7.60E+00	1.39E-02	7.82E-04
SO_2	--	6.00E-01	1.10E-03	6.18E-05
2-Methylnaphthalene	91-57-6	2.40E-05	4.39E-08	2.47E-09
3-Methylchloranthrene	56-49-5	1.80E-06	3.29E-09	1.85E-10
7,12-Dimethylbenz(a)anthracene	57-97-6	1.60E-05	2.93E-08	1.65E-09
Acenaphthene	83-32-9	1.80E-06	3.29E-09	1.85E-10
Acenaphthylene	203-96-8	1.80E-06	3.29E-09	1.85E-10
Anthracene	120-12-7	2.40E-06	4.39E-09	2.47E-10
Benz(a)anthracene	56-55-3	1.80E-06	3.29E-09	1.85E-10
Benzene	71-43-2	2.10E-03	3.84E-06	2.16E-07
Benzo(a)pyrene	50-32-8	1.20E-06	2.20E-09	1.24E-10
Benzo(b)fluoranthene	205-99-2	1.80E-06	3.29E-09	1.85E-10
Benzo(g,h,i)perylene	191-24-2	1.20E-06	2.20E-09	1.24E-10
Benzo(k)fluoranthene	205-82-3	1.80E-06	3.29E-09	1.85E-10
Chrysene	218-01-9	1.80E-06	3.29E-09	1.85E-10
Dibenzo(a,h)anthracene	53-70-3	1.20E-06	2.20E-09	1.24E-10
Dichlorobenzene	25321-22-6	1.20E-03	2.20E-06	1.24E-07
Fluoranthene	206-44-0	3.00E-06	5.49E-09	3.09E-10
Fluorene	86-73-7	2.80E-06	5.13E-09	2.88E-10
Formaldehyde	50-00-0	7.50E-02	1.37E-04	7.72E-06
Hexane	110-54-3	1.80E+00	3.29E-03	1.85E-04
Indeno(1,2,3-cd)pyrene	193-39-5	1.80E-06	3.29E-09	1.85E-10
Naphthalene	91-20-3	6.10E-04	1.12E-06	6.28E-08
Nitrous Oxide	10024-97-2	3.06E-01	5.60E-04	3.15E-05
Phenanathrene	85-01-8	1.70E-05	3.11E-08	1.75E-09
Pyrene	129-00-0	5.00E-06	9.15E-09	5.15E-10
Toluene	108-88-3	3.40E-03	6.22E-06	3.50E-07
Arsenic	7440-38-2	2.00E-04	3.66E-07	2.06E-08
Beryllium	7440-41-7	1.20E-05	2.20E-08	1.24E-09
Cadmium	7440-43-9	1.10E-03	2.01E-06	1.13E-07
Chromium	7440-47-3	1.40E-03	2.56E-06	1.44E-07
Cobalt	7440-48-4	8.40E-05	1.54E-07	8.65E-09
Manganese	7439-96-5	3.80E-04	6.96E-07	3.91E-08
Mercury	7439-97-6	2.60E-04	4.76E-07	2.68E-08
Nickel	7440-02-0	2.10E-03	3.84E-06	2.16E-07
Selenium	7782-49-2	2.40E-05	4.39E-08	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-03 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	7.76E-07	1.58E-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	1.38E-08	9.13E-09	2.94E-08	1.73E-03
2,2,4-Trimethylpentane	540-84-1	3.31E-07	1.26E-08	6.30E-07	3.21E-02
Benzene	71-43-2	4.22E-07	0.00E+00	7.97E-07	4.02E-02
Biphenyl	92-52-4	0.00E+00	4.64E-12	1.78E-12	2.12E-07
Cresols	1319-77-3	0.00E+00	1.56E-10	5.97E-11	7.11E-06
Ethylbenzene	100-41-4	3.02E-08	5.92E-09	5.94E-08	3.15E-03
Hexane (-n)	110-54-3	7.04E-07	5.26E-08	1.35E-06	6.95E-02
Isopropyl benzene (cumene)	98-82-8	2.23E-09	2.23E-09	5.07E-09	3.14E-04
Methanol	67-56-1	6.00E-08	0.00E+00	1.13E-07	5.72E-03
Naphthalene	91-20-3	3.29E-10	1.15E-09	1.06E-09	8.41E-05
Phenol	108-95-2	0.00E+00	1.69E-09	6.49E-10	7.73E-05
Styrene	100-42-5	1.69E-09	0.00E+00	3.19E-09	1.61E-04
Toluene	108-88-3	5.02E-07	2.99E-08	9.59E-07	4.92E-02
Xylenes	1330-20-7	1.90E-07	2.95E-08	3.71E-07	1.95E-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	550	gpm
Diesel	550	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		4.12E-05	1.25E-07	2.54E-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	4.29E-04
2,2,4-Trimethylpentane	540-84-1	1.63E-07	2.04E-09	1.02E-07	8.81E-03
Benzene	71-43-2	2.08E-07	0.00E+00	1.29E-07	1.11E-02
Biphenyl	92-52-4	0.00E+00	7.48E-13	2.86E-13	3.41E-08
Cresols	1319-77-3	0.00E+00	2.51E-11	9.63E-12	1.15E-06
Ethylbenzene	100-41-4	1.49E-08	9.55E-10	9.57E-09	8.40E-04
Hexane (-n)	110-54-3	3.47E-07	8.49E-09	2.18E-07	1.89E-02
Isopropyl benzene (cumene)	98-82-8	1.10E-09	3.60E-10	8.17E-10	7.52E-05
Methanol	**67-56-1**	2.96E-08	0.00E+00	1.83E-08	1.58E-03
Naphthalene	91-20-3	1.62E-10	1.86E-10	1.72E-10	1.72E-05
Phenol	108-95-2	0.00E+00	2.73E-10	1.05E-10	1.25E-05
Styrene	100-42-5	8.34E-10	0.00E+00	5.15E-10	4.45E-05
Toluene	108-88-3	2.48E-07	4.82E-09	1.55E-07	1.34E-02
Xylenes	1330-20-7	9.39E-08	4.77E-09	5.98E-08	5.23E-03

[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	550	gpm
Diesel	550	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	4.29E-04	1.73E-03	0.00E+00
2,2,4-Trimethylpentane	540-84-1	8.81E-03	3.21E-02	0.00E+00
Benzene	71-43-2	1.11E-02	4.02E-02	2.16E-07
Biphenyl	92-52-4	3.41E-08	2.12E-07	0.00E+00
Cresols	1319-77-3	1.15E-06	7.11E-06	0.00E+00
Ethylbenzene	100-41-4	8.40E-04	3.15E-03	0.00E+00
Hexane (-n)	110-54-3	1.89E-02	7.28E-02	1.85E-04
Isopropyl benzene (cumene)	98-82-8	7.52E-05	3.14E-04	0.00E+00
Methanol	67-56-1	1.58E-03	5.72E-03	0.00E+00
Naphthalene	91-20-3	1.72E-05	8.52E-05	6.28E-08
Naphthalene	91-20-3	1.72E-05	8.52E-05	6.28E-08
Phenol	108-95-2	1.25E-05	7.73E-05	0.00E+00
Styrene	100-42-5	4.45E-05	1.61E-04	0.00E+00
Toluene	108-88-3	1.34E-02	4.92E-02	3.50E-07
Xylenes	1330-20-7	5.23E-03	1.95E-02	0.00E+00
Dichlorobenzene	25321-22-6	--	2.20E-06	1.24E-07
Formaldehyde	50-00-0	--	1.37E-04	7.72E-06
Nitrous Oxide	10024-97-2	--	5.60E-04	3.15E-05
Arsenic	7440-38-2	--	3.66E-07	2.06E-08
Beryllium	7440-41-7	--	2.20E-08	1.24E-09
Cadmium	7440-43-9	--	2.01E-06	1.13E-07
Chromium	7440-47-3	--	2.56E-06	1.44E-07
Cobalt	7440-48-4	--	1.54E-07	8.65E-09
Manganese	7439-96-5	--	6.96E-07	3.91E-08
Mercury	7439-97-6	--	4.76E-07	2.68E-08
Nickel	7440-02-0	--	3.84E-06	2.16E-07
Selenium	7782-49-2	--	4.39E-08	2.47E-09
7-PAH		--	2.09E-08	1.17E-09
Benz(a)anthracene	56-55-3	--	3.29E-09	1.85E-10
Benzo(a)pyrene	50-32-8	--	2.20E-09	1.24E-10
Benzo(b)fluoranthene	205-99-2	--	3.29E-09	1.85E-10
Benzo(k)fluoranthene	205-82-3	--	3.29E-09	1.85E-10
Dibenzo(a,h)anthracene	53-70-3	--	2.20E-09	1.24E-10
Chrysene	218-01-9	--	3.29E-09	1.85E-10
Indeno(1,2,3-cd)pyrene	193-39-5	--	3.29E-09	1.85E-10
Other PAH		--	1.41E-07	7.91E-09
2-Methylnaphthalene	91-57-6	--	4.39E-08	2.47E-09
7,12-Dimethylbenz(a)anthracen	57-97-6	--	2.93E-08	1.65E-09
Benzo(g,h,i)perylene	191-24-2	--	2.20E-09	1.24E-10
3-Methylcholanthrene	56-49-5	--	3.29E-09	1.85E-10
Acenaphthene	83-32-9	--	3.29E-09	1.85E-10
Acenaphthylene	203-96-8	--	3.29E-09	1.85E-10
Anthracene	120-12-7	--	4.39E-09	2.47E-10
Fluoranthene	206-44-0	--	5.49E-09	3.09E-10
Fluorene	86-73-7	--	5.13E-09	2.88E-10
Phenanathrene	85-01-8	--	3.11E-08	1.75E-09
Pyrene	129-00-0	--	9.15E-09	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] ($\mu g/m^3$)
1,2,4-Trimethylbenzene	95-63-6	2.16E-03	5.36E-02	8.2	NO	NO	
2,2,4-Trimethylpentane	540-84-1	4.10E-02	1.10E+00	23.3	NO	NO	
Benzene	71-43-2	5.14E-02	1.39E+00	8.00E-04	YES	YES	0.12 - See Footnote
Biphenyl	92-52-4	2.46E-07	4.27E-06	0.1	NO	NO	
Cresols	1319-77-3	8.26E-06	1.43E-04	1.47	NO	NO	
Ethylbenzene	100-41-4	3.99E-03	1.05E-01	29	NO	NO	
Hexane (-n)	110-54-3	9.19E-02	2.37E+00	12	NO	NO	
Isopropyl benzene (cumene)	98-82-8	3.90E-04	9.40E-03	16.3	NO	NO	
Methanol	67-56-1	7.30E-03	1.97E-01	17.3	NO	NO	
Naphthalene	91-20-3	1.02E-04	2.15E-03	9.1E-05	YES	YES	0.014
Naphthalene	91-20-3	1.02E-04	2.15E-03	3.33	NO	NO	
Phenol	108-95-2	8.98E-05	1.56E-03	1.27	NO	NO	
Styrene	100-42-5	2.06E-04	5.56E-03	6.67	NO	NO	
Toluene	108-88-3	6.27E-02	1.68E+00	25	NO	NO	
Xylenes	1330-20-7	2.47E-02	6.53E-01	29	NO	NO	
Dichlorobenzene	25321-22-6	2.32E-06	--	20	--	NO	
Formaldehyde	50-00-0	1.45E-04	--	5.10E-04	--	NO	
Nitrous Oxide	10024-97-2	5.92E-04	--	6	--	NO	
Arsenic	7440-38-2	3.87E-07	--	1.5E-06	--	NO	
Beryllium	7440-41-7	2.32E-08	--	2.8E-05	--	NO	
Cadmium	7440-43-9	2.13E-06	--	3.7E-06	--	NO	
Chromium	7440-47-3	2.71E-06	--	0.033	--	NO	
Cobalt	7440-48-4	1.62E-07	--	0.0033	--	NO	
Manganese	7439-96-5	7.35E-07	--	0.067	--	NO	
Mercury	7439-97-6	5.03E-07	--	--	--	--	
Nickel	7440-02-0	4.06E-06	--	2.7E-05	--	NO	
Selenium	7782-49-2	4.64E-08	--	0.013	--	NO	
7-PAH		2.20E-08	--	2.0E-06	--	NO	
Benz(a)anthracene	56-55-3	3.48E-09	--	--	--	--	
Benzo(a)pyrene	50-32-8	2.32E-09	--	2.00E-06	--	NO	
Benzo(b)fluoranthene	205-99-2	3.48E-09	--	--	--	--	
Benzo(k)fluoranthene	205-82-3	3.48E-09	--	--	--	--	
Dibenzo(a,h)anthracene	53-70-3	2.32E-09	--	--	--	--	
Chrysene	218-01-9	3.48E-09	--	--	--	--	
Indeno(1,2,3-cd)pyrene	193-39-5	3.48E-09	--	--	--	--	
Other PAH		1.48E-07	--	9.1E-05	--	NO	
2-Methylnaphthalene	91-57-6	4.64E-08	--	--	--	--	
7,12-Dimethylbenz(a)anthra	57-97-6	3.09E-08	--	--	--	--	
Benzo(g,h,i)perylene	191-24-2	2.32E-09	--	--	--	--	
3-Methylcholanthrene	56-49-5	3.48E-09	--	2.50E-06	--	NO	
Acenaphthene	83-32-9	3.48E-09	--	--	--	--	
Acenaphthylene	203-96-8	3.48E-09	--	--	--	--	
Anthracene	120-12-7	4.64E-09	--	--	--	--	
Fluoranthene	206-44-0	5.80E-09	--	--	--	--	
Fluorene	86-73-7	5.41E-09	--	--	--	--	
Phenanathrene	85-01-8	3.29E-08	--	--	--	--	
Pyrene	129-00-0	9.67E-09	--	--	--	--	

[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)
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 [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)**
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

a Total annual potential emissions from the VCU are provided in Tables C-7 and C-13. Loading rack emissions of NO_X, CO, and VOC are calculated using the emission factors shown in Table C-7, while emissions of PM and SO_2 are estimated in Table C-13. Criteria pollutant emissions from natural gas combustion at the comfort heater are calculated in Table C-13 as well. (Emissions from the comfort heater are calculated at PTE for both hourly and annual emssions, so hourly emission rates convert exactly to annual emission rates.)

b Total short-term potential emissions of criteria pollutants are calculated in Tables C-14b, C-14c, and C-15. 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.

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

Emission Source	Heat Rate (Btu/hr)	Annual Emissions [a] (tpy)	Annual Emissions [a] (g/s)	Short-Term Emissions [b] (lb/hr)	Short-Term Emissions [b] (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**

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

b Emissions provided in Table C-17a and C-17b above.

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

Emission Source	Heat Rate (Btu/hr)	Benzene Annual Emissions [a] (tpy)	Benzene Annual Emissions [a] (g/s)	Naphthalene Annual Emissions [a] (tpy)	Naphthalene Annual Emissions [a] (g/s)
VCU	--	8.74E-04	2.514E-05	7.61E-05	2.190E-06
Heater #1	105,000	9.47E-07	2.724E-08	2.75E-07	7.912E-09
Total		**8.75E-04**	**2.52E-05**	**7.64E-05**	**2.20E-06**

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.

	CAS No.:	Heater Total Emissions (tpy):	VCU Combustion Emissions (tpy):
Benzene CAS No.:	71-43-2	9.469E-07	8.803E-06
Naphthalene CAS No.:	91-20-3	2.750E-07	2.557E-06

Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 901 Post-Project
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank 901 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		VFR - Cone
Normal Capacity		Cap	gal	369,600
Diameter		D	ft	42.53
Shell Height or Length		H_S	ft	39.34
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	42.5
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	39.3
External Shell Color		SC_{ext}		Aluminum/Specular
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Aluminum/Specular
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.39
Tank Roof Paint Solar Absorbance		α_{Roof}		0.39
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.39
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	36.9
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	0.6
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	0.09
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	52,421
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary

Annual Throughput, gal	15,230,259	**Annual Emissions**	0.18
Annual Turnovers	38.84		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	15.03	0.008	
Feb	13.81	0.007	
Mar	16.35	0.008	
Apr	23.70	0.012	
May	35.65	0.018	
Jun	48.25	0.024	
Jul	64.20	0.032	
Aug	58.49	0.029	
Sep	39.52	0.020	
Oct	25.43	0.013	
Nov	14.41	0.007	
Dec	14.90	0.0074	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type				= User specified		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified		1,293,529	1,168,349	1,293,529	1,251,802	1,293,529
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		18.5	18.5	18.5	18.5	18.5
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		21.5	21.5	21.5	21.5	21.5
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0337	0.0402	0.0508	0.0644	0.0746
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		0.94	0.94	0.94	0.94	0.94
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.996	0.996	0.996	0.995	0.993
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		M_L	lb/lb-mole			188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		3.30	2.98	3.30	3.19	3.30
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		21.04	26.79	33.73	41.68	49.96
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		30.40	37.97	47.85	59.56	70.67
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		18.73	22.35	28.24	35.76	41.42

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		1,251,802	1,293,529	1,293,529	1,251,802	1,293,529	1,251,802	1,293,529
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	8,907	8,907	8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	18.5	18.5	18.5	18.5	18.5	18.5	18.5
Vapor Space Outage		21.5	21.5	21.5	21.5	21.5	21.5	21.5
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0833	0.0909	0.0854	0.0731	0.0591	0.0371	0.0325
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.990	0.987	0.988	0.991	0.994	0.996	0.996
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		188.0	188.0	188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	3.19	3.30	3.30	3.19	3.30	3.19	3.30
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		58.65	65.79	63.68	54.44	43.91	33.11	22.44
Daily Maximum Liquid Surf. Temperature, F		81.79	91.04	87.40	74.74	60.33	43.43	31.46
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	46.27	50.49	47.43	40.59	32.84	20.62	18.04

Calculations					2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	25.72	32.38	40.79	50.62	60.32
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	24.64	30.44	37.64	46.24	54.89
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	0.0031	0.0031	0.0032	0.0046	0.0066
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia		0.0031	0.0031	0.0031	0.0033	0.0045
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia		0.0031	0.0031	0.0042	0.0064	0.0092
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}	0.001	0.001	0.002	0.003	0.004
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}	0.00008	0.00008	0.00008	0.00011	0.00015
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}	30,583	30,583	30,583	30,583	30,583
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}	2.46	2.62	3.73	6.45	10.75
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}	12.56	11.19	12.62	17.25	24.89
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**	**15.03**	**13.81**	**16.35**	**23.70**	**35.65**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**	**15.03**	**13.81**	**16.35**	**23.70**	**35.65**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	70.22	78.41	75.54	64.59	52.12	38.27	26.95
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	63.99	71.89	69.94	60.29	49.34	36.94	26.09
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.0091	0.0115	0.0107	0.0076	0.0049	0.0031	0.0031
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0062	0.0079	0.0074	0.0054	0.0036	0.0031	0.0031
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.0127	0.0166	0.0150	0.0104	0.0066	0.0036	0.0031
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.007	0.009	0.008	0.005	0.003	0.001	0.001
Vapor Density		0.00021	0.00026	0.00024	0.00018	0.00012	0.00008	0.00008
Vapor Space Volume		30,583	30,583	30,583	30,583	30,583	30,583	30,583
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	15.68	22.06	19.30	11.75	6.50	2.56	2.37
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	32.57	42.13	39.19	27.77	18.93	11.85	12.53
Total Losses	**Uncontrolled emissions.**	**48.25**	**64.20**	**58.49**	**39.52**	**25.43**	**14.41**	**14.90**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**48.25**	**64.20**	**58.49**	**39.52**	**25.43**	**14.41**	**14.90**

Speciated Component Emissions	Species ID	Controlled with Carbon Adsorption?	Annual Emissions	Controlled Monthly Emissions ($L_{T,CD-i}$ lb/month) = ($P_{VA,Tla-i}$ * M_{V-i} / ($P_{VA,Tla}$ * M_V) * (1 - CD_{eff})) * L_T				
Component Name			lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	--	24.21	0.81	0.92	1.34	1.77	2.42
Benzene	2	--	0.00					
2,2,4-Trimethylpentane (isooctane)	3	--	5.65	0.17	0.20	0.29	0.40	0.57
Toluene	4	--	13.08	0.36	0.42	0.65	0.91	1.31
Ethylbenzene	5	--	2.51	0.06	0.07	0.11	0.17	0.25
Xylenes (mixed isomers)	6	--	8.79	0.21	0.25	0.40	0.58	0.87
Isopropyl benzene (Cumene)	7	--	0.92	0.02	0.02	0.04	0.06	0.09
Methyl-tert-butyl ether (MTBE)	8	--	0.00					
1,2,4-Trimethylbenzene	9	--	3.71	0.07	0.09	0.15	0.23	0.36
Cyclohexane	10	--	0.00					
Gasoline (RVP 13)	11	--	0.00					
Ethyl alcohol	12	--	0.00					
Acetaldehyde	13	--	0.00					
Methyl alcohol (Methanol)	14	--	0.00					
Naphthalene	15	--	0.35	0.01	0.01	0.01	0.02	0.03
Styrene	16	--	0.00					
Cresol (-m)	17	--	0.06	0.00	0.00	0.00	0.00	0.01
Biphenyl	18	--	0.02	0.00	0.00	0.00	0.00	0.00
Phenol	19	--	0.62	0.01	0.01	0.02	0.03	0.06
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	3.06	3.90	3.59	2.57	1.86	1.13	0.84
Benzene							
2,2,4-Trimethylpentane (isooctane)	0.73	0.96	0.87	0.61	0.42	0.25	0.18
Toluene	1.73	2.30	2.09	1.42	0.96	0.54	0.38
Ethylbenzene	0.34	0.47	0.42	0.28	0.18	0.10	0.06
Xylenes (mixed isomers)	1.20	1.65	1.48	0.97	0.62	0.33	0.22
Isopropyl benzene (Cumene)	0.13	0.18	0.16	0.10	0.06	0.03	0.02
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.53	0.75	0.66	0.41	0.25	0.12	0.08
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)							
Naphthalene	0.05	0.07	0.07	0.04	0.02	0.01	0.01
Styrene							
Cresol (-m)	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Biphenyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.10	0.15	0.13	0.07	0.04	0.01	0.01
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Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 902 Post-Project
Tank Name		TK_{name}		Pocatello Tank 902 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank Roof Type		TK_{roof}		IFR - Column Supported Roof
Normal Capacity		Cap	gal	324,324
Diameter		D	ft	42.5
Shell Height or Length		H_S	ft	0.0
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= (α_{Shell} + α_{Roof}) / 2 {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Floating Roof Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Rim-Seal System		$TK_{RimSeal}$		Vapor-mounted/None
Tank Fittings		$TK_{Fittings}$		Default
Number of fixed roof support columns		N_{Col}		1
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	0.7
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		--
Deck Type		TK_{Deck}		Welded
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	= π * D^2 / 4 {Eqn. 2-9}	A_{deck}	ft^2	1,418.6
Deck Seam Length Factor	= L_{Seam} / A_{deck} {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	6.7
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.2
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.0
Seal related wind speed exponent		n		3.0

Emission Summary

Annual Throughput, gal	**2,520,000**	**Annual Turnovers**	**7.77**	Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.
Annual Emissions, tons	**1.99**			
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**		
Jan	185.82	0.093		
Feb	191.68	0.096		
Mar	250.10	0.125		
Apr	294.49	0.147		
May	371.16	0.186		
Jun	444.15	0.222		
Jul	554.61	0.277		
Aug	528.98	0.264		
Sep	407.18	0.204		
Oct	326.68	0.163		
Nov	238.20	0.119		
Dec	192.11	0.0961		

Calculations					1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	Transmix	Transmix	Transmix	Transmix	Transmix
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Transmix - Pocatello	Transmix - Pocatello	Transmix - Pocatello	Transmix - Pocatello	Transmix - Pocatello
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	214,027	193,315	214,027	207,123	214,027
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= $[(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}	319.9	319.9	319.9	319.9	319.9
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		541	820	1,215	1,613	1,953
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = $0.14 * t_{IS} / t_{yr}$ {bolted deck}	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla-i}/P_{VA,Tla}))$ $M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}	66.0	66.0	66.0	66.0	66.0
Liquid Molecular Weight		M_L	lb/lb-mole		111.0	111.0	111.0	111.0	111.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} $= \Sigma (M_{L-i} * Z_{Li})$ {full speciation, Eqn. 1-22}	6.10	6.10	6.10	6.10	6.10
Average Daily Minimum Ambient Temperature		T_{AN}	°F		14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F		32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	$= (T_{AX} + T_{AN}) / 2$ {Eqn. 1-27}	23.30	29.10	36.30	44.90	53.55
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	$= (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}	24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	$= T_{AA} + (6 * \alpha_{Tot} - 1)$ {Eqn. 1-28}	23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$	2.4934	2.8285	3.2992	3.9364	4.6684
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia		2.4567	2.7666	3.1954	3.7775	4.4477
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_f		$= (P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}	0.0545	0.0623	0.0735	0.0895	0.1092
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		L_R	lb/month	$= (K_{Ra} + K_{Rb} * v^n) * D * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}	87.01	89.82	117.28	138.21	174.30
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	$= 0.943 * (Q / (42 \text{ gal/bbl})) * C_S * W_L / D * (1 + (N_{Col} * F_C / D))$ {Eqn. 2-4}	1.05	0.95	1.05	1.02	1.05
Deck Fitting Loss		L_F	lb/month	$= F_F * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}	97.76	100.91	131.76	155.27	195.81
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} $= K_D * S_D * D^2 * P_f * M_V * K_C$ {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**$= L_R + L_{WD} + L_F + L_D$ {Eqn. 2-1}**	**185.82**	**191.68**	**250.10**	**294.49**	**371.16**

	Calculatio	6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Transmix	Transmix	Transmix	Transmix	Transmix	Transmix	Transmix
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Transmix - Pocatello	Transmix - Pocatello	Transmix - Pocatello	Transmix - Pocatello	Transmix - Pocatello	Transmix - Pocatello	Transmix - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		207,123	214,027	214,027	207,123	214,027	207,123	214,027
Days-In-Service	Input "0" for OOS	30	31	31	30	31	30	31
Shell Clingage Factor		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	319.9	319.9	319.9	319.9	319.9	319.9	319.9
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Product Factor	Eqn. 2-3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	66.0	66.0	66.0	66.0	66.0	66.0	66.0
Liquid Molecular Weight		111.0	111.0	111.0	111.0	111.0	111.0	111.0
Liquid Density at 60 °F		6.10	6.10	6.10	6.10	6.10	6.10	6.10
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	5.5414	6.3834	6.1266	5.1068	4.1198	3.2034	2.5641
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	5.2544	6.0477	5.8434	4.9132	4.0074	3.1514	2.5314
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.1351	0.1633	0.1558	0.1238	0.0961	0.0723	0.0564
Average Ambient Wind Speed	Monthly Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		208.68	260.69	248.62	191.28	153.35	111.70	89.97
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	1.02	1.05	1.05	1.02	1.05	1.02	1.05
Deck Fitting Loss		234.44	292.87	279.31	214.89	172.28	125.49	101.08
Deck Seam Loss		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**444.15**	**554.61**	**528.98**	**407.18**	**326.68**	**238.20**	**192.11**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi}	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$				
Component Name		(lb/lb-mol)	lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	86.17	14.71	0.52	0.57	0.80	1.02	1.39
Benzene	2	78.11	8.51	0.28	0.32	0.45	0.58	0.80
2,2,4-Trimethylpentane (isooctane)	3	114.23	6.68	0.22	0.24	0.35	0.45	0.63
Toluene	4	92.13	9.99	0.31	0.35	0.50	0.66	0.94
Ethylbenzene	5	106.17	0.63	0.02	0.02	0.03	0.04	0.06
Xylenes (mixed isomers)	6	106.17	2.79	0.09	0.10	0.14	0.18	0.26
Isopropyl benzene (Cumene)	7	120.2	0.06	0.00	0.00	0.00	0.00	0.01
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00					
1,2,4-Trimethylbenzene	9	120.19	0.40	0.02	0.02	0.02	0.03	0.04
Cyclohexane	10	84.16	0.00					
Gasoline (RVP 13)	11	62	0.00					
Ethyl alcohol	12	46.07	0.00					
Acetaldehyde	13	44	0.00					
Methyl alcohol (Methanol)	14	32.04	1.15	0.03	0.04	0.06	0.08	0.11
Naphthalene	15	128.2	0.04	0.00	0.00	0.00	0.00	0.00
Styrene	16	104.15	0.03	0.00	0.00	0.00	0.00	0.00
Cresol (-m)	17	108.1	0.00	0.00	0.00	0.00	0.00	0.00
Biphenyl	18	154.21	0.01	0.00	0.00	0.00	0.00	0.00
Phenol	19	94.11	0.02	0.00	0.00	0.00	0.00	0.00
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	1.79	2.37	2.22	1.58	1.16	0.75	0.55
Benzene	1.05	1.41	1.31	0.92	0.66	0.42	0.30
2,2,4-Trimethylpentane (isooctane)	0.83	1.12	1.04	0.73	0.52	0.32	0.23
Toluene	1.26	1.73	1.60	1.09	0.76	0.47	0.32
Ethylbenzene	0.08	0.11	0.10	0.07	0.05	0.03	0.02
Xylenes (mixed isomers)	0.35	0.49	0.45	0.30	0.21	0.13	0.09
Isopropyl benzene (Cumene)	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.05	0.06	0.06	0.04	0.03	0.02	0.02
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)	0.15	0.20	0.19	0.13	0.09	0.05	0.04
Naphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Styrene	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Cresol (-m)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Biphenyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.00	0.00	0.00	0.00	0.00	0.00	0.00
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Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 903 Post-Project
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank 903 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		VFR - Cone
Normal Capacity		Cap	gal	380,772
Diameter		D	ft	40
Shell Height or Length		H_S	ft	42
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	40.0
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	42.0
External Shell Color		SC_{ext}		Aluminum/Specular
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Aluminum/Specular
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.39
Tank Roof Paint Solar Absorbance		α_{Roof}		0.39
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.39
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	38.3
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	0.4
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	0.06
Tank Maximum Liquid Volume	= π/4 * $D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	48,129
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary

Annual Throughput, gal	15,690,628	**Annual Emissions**	0.17
Annual Turnovers	43.58		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	14.14	0.007	
Feb	13.00	0.007	
Mar	15.40	0.008	
Apr	22.34	0.011	
May	33.62	0.017	
Jun	45.52	0.023	
Jul	60.58	0.030	
Aug	55.18	0.028	
Sep	37.26	0.019	
Oct	23.96	0.012	
Nov	13.56	0.007	
Dec	14.02	0.0070	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type				= User specified		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified		1,332,629	1,203,665	1,332,629	1,289,641	1,332,629
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		19.2	19.2	19.2	19.2	19.2
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		23.3	23.3	23.3	23.3	23.3
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0337	0.0402	0.0508	0.0644	0.0746
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		0.86	0.86	0.86	0.86	0.86
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.996	0.996	0.996	0.994	0.992
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		M_L	lb/lb-mole			188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		3.70	3.34	3.70	3.58	3.70
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		21.04	26.79	33.73	41.68	49.96
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		30.40	37.97	47.85	59.56	70.67
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		18.73	22.35	28.24	35.76	41.42

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		1,289,641	1,332,629	1,332,629	1,289,641	1,332,629	1,289,641	1,332,629
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	8,907	8,907	8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	19.2	19.2	19.2	19.2	19.2	19.2	19.2
Vapor Space Outage		23.3	23.3	23.3	23.3	23.3	23.3	23.3
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0833	0.0909	0.0854	0.0731	0.0591	0.0371	0.0325
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	0.86	0.86	0.86	0.86	0.86	0.86	0.86
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.989	0.986	0.987	0.991	0.994	0.996	0.996
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		188.0	188.0	188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	3.58	3.70	3.70	3.58	3.70	3.58	3.70
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		58.65	65.79	63.68	54.44	43.91	33.11	22.44
Daily Maximum Liquid Surf. Temperature, F		81.79	91.04	87.40	74.74	60.33	43.43	31.46
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	46.27	50.49	47.43	40.59	32.84	20.62	18.04

Calculations					2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	25.72	32.38	40.79	50.62	60.32
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	24.64	30.44	37.64	46.24	54.89
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	0.0031	0.0031	0.0032	0.0046	0.0066
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia		0.0031	0.0031	0.0031	0.0033	0.0045
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia		0.0031	0.0031	0.0042	0.0064	0.0092
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}	0.001	0.001	0.002	0.003	0.004
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}	0.00008	0.00008	0.00008	0.00011	0.00015
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}	29,217	29,217	29,217	29,217	29,217
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}	2.35	2.50	3.56	6.16	10.27
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}	11.78	10.50	11.84	16.18	23.35
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**	**14.14**	**13.00**	**15.40**	**22.34**	**33.62**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**	**14.14**	**13.00**	**15.40**	**22.34**	**33.62**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	70.22	78.41	75.54	64.59	52.12	38.27	26.95
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	63.99	71.89	69.94	60.29	49.34	36.94	26.09
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.0091	0.0115	0.0107	0.0076	0.0049	0.0031	0.0031
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0062	0.0079	0.0074	0.0054	0.0036	0.0031	0.0031
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.0127	0.0166	0.0150	0.0104	0.0066	0.0036	0.0031
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.007	0.009	0.008	0.005	0.003	0.001	0.001
Vapor Density		0.00021	0.00026	0.00024	0.00018	0.00012	0.00008	0.00008
Vapor Space Volume		29,217	29,217	29,217	29,217	29,217	29,217	29,217
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	14.96	21.06	18.42	11.21	6.20	2.44	2.26
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	30.55	39.52	36.76	26.05	17.76	11.12	11.76
Total Losses	**Uncontrolled emissions.**	**45.52**	**60.58**	**55.18**	**37.26**	**23.96**	**13.56**	**14.02**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**45.52**	**60.58**	**55.18**	**37.26**	**23.96**	**13.56**	**14.02**

Speciated Component Emissions	Species ID	Controlled with Carbon Adsorption?	Annual Emissions	Controlled Monthly Emissions ($L_{T,CD-i}$ lb/month) = ($P_{VA,Tla-i}$ * M_{V-i} / ($P_{VA,Tla}$ * M_V) * (1 - CD_{eff})) * L_T				
Component Name			lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	--	22.82	0.77	0.86	1.26	1.67	2.28
Benzene	2	--	0.00					
2,2,4-Trimethylpentane (isooctane)	3	--	5.33	0.16	0.19	0.28	0.38	0.53
Toluene	4	--	12.33	0.34	0.40	0.61	0.86	1.23
Ethylbenzene	5	--	2.36	0.06	0.07	0.11	0.16	0.24
Xylenes (mixed isomers)	6	--	8.29	0.20	0.24	0.38	0.55	0.82
Isopropyl benzene (Cumene)	7	--	0.87	0.02	0.02	0.04	0.06	0.09
Methyl-tert-butyl ether (MTBE)	8	--	0.00					
1,2,4-Trimethylbenzene	9	--	3.50	0.07	0.08	0.14	0.22	0.34
Cyclohexane	10	--	0.00					
Gasoline (RVP 13)	11	--	0.00					
Ethyl alcohol	12	--	0.00					
Acetaldehyde	13	--	0.00					
Methyl alcohol (Methanol)	14	--	0.00					
Naphthalene	15	--	0.33	0.01	0.01	0.01	0.02	0.03
Styrene	16	--	0.00					
Cresol (-m)	17	--	0.06	0.00	0.00	0.00	0.00	0.01
Biphenyl	18	--	0.02	0.00	0.00	0.00	0.00	0.00
Phenol	19	--	0.59	0.01	0.01	0.02	0.03	0.05
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	2.88	3.68	3.39	2.43	1.75	1.07	0.79
Benzene							
2,2,4-Trimethylpentane (isooctane)	0.69	0.90	0.82	0.57	0.40	0.23	0.17
Toluene	1.64	2.17	1.97	1.34	0.90	0.51	0.35
Ethylbenzene	0.32	0.44	0.40	0.26	0.17	0.09	0.06
Xylenes (mixed isomers)	1.14	1.56	1.40	0.91	0.58	0.31	0.20
Isopropyl benzene (Cumene)	0.12	0.17	0.15	0.10	0.06	0.03	0.02
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.50	0.71	0.63	0.39	0.23	0.12	0.07
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)							
Naphthalene	0.05	0.07	0.06	0.04	0.02	0.01	0.01
Styrene							
Cresol (-m)	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Biphenyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.09	0.14	0.12	0.07	0.03	0.01	0.01
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Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 905 Post-Project
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank 905 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		VFR - Cone
Normal Capacity		Cap	gal	376,782
Diameter		D	ft	42.51
Shell Height or Length		H_S	ft	39.2
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	42.5
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	39.2
External Shell Color		SC_{ext}		Aluminum/Specular
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Aluminum/Specular
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.39
Tank Roof Paint Solar Absorbance		α_{Roof}		0.39
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.39
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	37.1
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + ^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	0.4
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	0.05
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	52,656
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary

Annual Throughput, gal	15,526,211	**Annual Emissions**	0.18
Annual Turnovers	39.41		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	15.06	0.008	
Feb	13.83	0.007	
Mar	16.35	0.008	
Apr	23.66	0.012	
May	35.55	0.018	
Jun	48.09	0.024	
Jul	63.95	0.032	
Aug	58.29	0.029	
Sep	39.42	0.020	
Oct	25.40	0.013	
Nov	14.43	0.007	
Dec	14.93	0.0075	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type				= User specified		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified		1,318,664	1,191,052	1,318,664	1,276,127	1,318,664
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		18.6	18.6	18.6	18.6	18.6
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		21.0	21.0	21.0	21.0	21.0
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0337	0.0402	0.0508	0.0644	0.0746
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		0.93	0.93	0.93	0.93	0.93
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.997	0.997	0.996	0.995	0.993
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		M_L	lb/lb-mole			188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		3.35	3.02	3.35	3.24	3.35
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		21.04	26.79	33.73	41.68	49.96
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		30.40	37.97	47.85	59.56	70.67
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		18.73	22.35	28.24	35.76	41.42

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		1,276,127	1,318,664	1,318,664	1,276,127	1,318,664	1,276,127	1,318,664
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	8,907	8,907	8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	18.6	18.6	18.6	18.6	18.6	18.6	18.6
Vapor Space Outage		21.0	21.0	21.0	21.0	21.0	21.0	21.0
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0833	0.0909	0.0854	0.0731	0.0591	0.0371	0.0325
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	0.93	0.93	0.93	0.93	0.93	0.93	0.93
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.990	0.987	0.988	0.992	0.995	0.997	0.997
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		188.0	188.0	188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	3.24	3.35	3.35	3.24	3.35	3.24	3.35
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		58.65	65.79	63.68	54.44	43.91	33.11	22.44
Daily Maximum Liquid Surf. Temperature, F		81.79	91.04	87.40	74.74	60.33	43.43	31.46
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	46.27	50.49	47.43	40.59	32.84	20.62	18.04

Calculations					2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	25.72	32.38	40.79	50.62	60.32
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	24.64	30.44	37.64	46.24	54.89
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	0.0031	0.0031	0.0032	0.0046	0.0066
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia		0.0031	0.0031	0.0031	0.0033	0.0045
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia		0.0031	0.0031	0.0042	0.0064	0.0092
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}	0.001	0.001	0.002	0.003	0.004
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}	0.00008	0.00008	0.00008	0.00011	0.00015
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}	29,811	29,811	29,811	29,811	29,811
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}	2.40	2.55	3.64	6.29	10.48
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}	12.65	11.27	12.71	17.37	25.07
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**	**15.06**	**13.83**	**16.35**	**23.66**	**35.55**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**	**15.06**	**13.83**	**16.35**	**23.66**	**35.55**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	70.22	78.41	75.54	64.59	52.12	38.27	26.95
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	63.99	71.89	69.94	60.29	49.34	36.94	26.09
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.0091	0.0115	0.0107	0.0076	0.0049	0.0031	0.0031
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0062	0.0079	0.0074	0.0054	0.0036	0.0031	0.0031
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.0127	0.0166	0.0150	0.0104	0.0066	0.0036	0.0031
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.007	0.009	0.008	0.005	0.003	0.001	0.001
Vapor Density		0.00021	0.00026	0.00024	0.00018	0.00012	0.00008	0.00008
Vapor Space Volume		29,811	29,811	29,811	29,811	29,811	29,811	29,811
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	15.29	21.51	18.82	11.45	6.33	2.50	2.31
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	32.80	42.43	39.47	27.97	19.06	11.94	12.62
Total Losses	**Uncontrolled emissions.**	**48.09**	**63.95**	**58.29**	**39.42**	**25.40**	**14.43**	**14.93**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**48.09**	**63.95**	**58.29**	**39.42**	**25.40**	**14.43**	**14.93**

Speciated Component Emissions	Species ID	Controlled with Carbon Adsorption?	Annual Emissions	Controlled Monthly Emissions ($L_{T,CD-i}$ lb/month) = ($P_{VA,Tla-i}$ * M_{V-i} / ($P_{VA,Tla}$ * M_V) * (1 - CD_{eff})) * L_T				
Component Name			lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	--	24.16	0.82	0.92	1.34	1.77	2.41
Benzene	2	--	0.00					
2,2,4-Trimethylpentane (isooctane)	3	--	5.64	0.17	0.20	0.29	0.40	0.56
Toluene	4	--	13.05	0.36	0.42	0.65	0.91	1.30
Ethylbenzene	5	--	2.50	0.06	0.07	0.11	0.17	0.25
Xylenes (mixed isomers)	6	--	8.77	0.21	0.25	0.40	0.58	0.87
Isopropyl benzene (Cumene)	7	--	0.92	0.02	0.02	0.04	0.06	0.09
Methyl-tert-butyl ether (MTBE)	8	--	0.00					
1,2,4-Trimethylbenzene	9	--	3.70	0.07	0.09	0.15	0.23	0.36
Cyclohexane	10	--	0.00					
Gasoline (RVP 13)	11	--	0.00					
Ethyl alcohol	12	--	0.00					
Acetaldehyde	13	--	0.00					
Methyl alcohol (Methanol)	14	--	0.00					
Naphthalene	15	--	0.35	0.01	0.01	0.01	0.02	0.03
Styrene	16	--	0.00					
Cresol (-m)	17	--	0.06	0.00	0.00	0.00	0.00	0.01
Biphenyl	18	--	0.02	0.00	0.00	0.00	0.00	0.00
Phenol	19	--	0.62	0.01	0.01	0.02	0.03	0.06
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	3.04	3.89	3.58	2.57	1.85	1.14	0.84
Benzene							
2,2,4-Trimethylpentane (isooctane)	0.73	0.95	0.87	0.61	0.42	0.25	0.18
Toluene	1.73	2.29	2.08	1.42	0.96	0.54	0.38
Ethylbenzene	0.34	0.47	0.42	0.27	0.18	0.10	0.06
Xylenes (mixed isomers)	1.20	1.64	1.48	0.96	0.62	0.33	0.22
Isopropyl benzene (Cumene)	0.13	0.18	0.16	0.10	0.06	0.03	0.02
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.53	0.75	0.66	0.41	0.25	0.12	0.08
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)							
Naphthalene	0.05	0.07	0.06	0.04	0.02	0.01	0.01
Styrene							
Cresol (-m)	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Biphenyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.10	0.15	0.13	0.07	0.04	0.01	0.01
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Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 906 Post-Project
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank 906 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		VFR - Cone
Normal Capacity		Cap	gal	379,176
Diameter		D	ft	42.52
Shell Height or Length		H_S	ft	39.37
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	42.5
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	39.4
External Shell Color		SC_{ext}		Aluminum/Specular
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Aluminum/Specular
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.39
Tank Roof Paint Solar Absorbance		α_{Roof}		0.39
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.39
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	38.0
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	1.2
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	0.17
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	53,959
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary

Annual Throughput, gal	15,624,861	**Annual Emissions**	0.19
Annual Turnovers	38.71		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	15.39	0.008	
Feb	14.14	0.007	
Mar	16.72	0.008	
Apr	24.21	0.012	
May	36.38	0.018	
Jun	49.21	0.025	
Jul	65.44	0.033	
Aug	59.65	0.030	
Sep	40.33	0.020	
Oct	25.98	0.013	
Nov	14.76	0.007	
Dec	15.26	0.0076	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type				= User specified		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified		1,327,043	1,198,619	1,327,043	1,284,235	1,327,043
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		19.0	19.0	19.0	19.0	19.0
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		21.6	21.6	21.6	21.6	21.6
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0337	0.0402	0.0508	0.0644	0.0746
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		0.94	0.94	0.94	0.94	0.94
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.996	0.996	0.996	0.995	0.993
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		M_L	lb/lb-mole			188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		3.29	2.97	3.29	3.18	3.29
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		21.04	26.79	33.73	41.68	49.96
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		30.40	37.97	47.85	59.56	70.67
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		18.73	22.35	28.24	35.76	41.42

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		1,284,235	1,327,043	1,327,043	1,284,235	1,327,043	1,284,235	1,327,043
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	8,907	8,907	8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Vapor Space Outage		21.6	21.6	21.6	21.6	21.6	21.6	21.6
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0833	0.0909	0.0854	0.0731	0.0591	0.0371	0.0325
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	0.94	0.94	0.94	0.94	0.94	0.94	0.94
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.990	0.987	0.988	0.991	0.994	0.996	0.996
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		188.0	188.0	188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	3.18	3.29	3.29	3.18	3.29	3.18	3.29
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		58.65	65.79	63.68	54.44	43.91	33.11	22.44
Daily Maximum Liquid Surf. Temperature, F		81.79	91.04	87.40	74.74	60.33	43.43	31.46
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	46.27	50.49	47.43	40.59	32.84	20.62	18.04

Calculations					2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	25.72	32.38	40.79	50.62	60.32
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	24.64	30.44	37.64	46.24	54.89
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	0.0031	0.0031	0.0032	0.0046	0.0066
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia		0.0031	0.0031	0.0031	0.0033	0.0045
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia		0.0031	0.0031	0.0042	0.0064	0.0092
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}	0.001	0.001	0.002	0.003	0.004
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}	0.00008	0.00008	0.00008	0.00011	0.00015
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}	30,635	30,635	30,635	30,635	30,635
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}	2.47	2.62	3.74	6.46	10.77
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}	12.92	11.52	12.98	17.75	25.61
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**	**15.39**	**14.14**	**16.72**	**24.21**	**36.38**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**	**15.39**	**14.14**	**16.72**	**24.21**	**36.38**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	70.22	78.41	75.54	64.59	52.12	38.27	26.95
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	63.99	71.89	69.94	60.29	49.34	36.94	26.09
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.0091	0.0115	0.0107	0.0076	0.0049	0.0031	0.0031
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0062	0.0079	0.0074	0.0054	0.0036	0.0031	0.0031
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.0127	0.0166	0.0150	0.0104	0.0066	0.0036	0.0031
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.007	0.009	0.008	0.005	0.003	0.001	0.001
Vapor Density		0.00021	0.00026	0.00024	0.00018	0.00012	0.00008	0.00008
Vapor Space Volume		30,635	30,635	30,635	30,635	30,635	30,635	30,635
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	15.70	22.10	19.33	11.76	6.51	2.56	2.37
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	33.51	43.34	40.32	28.57	19.47	12.19	12.89
Total Losses	**Uncontrolled emissions.**	**49.21**	**65.44**	**59.65**	**40.33**	**25.98**	**14.76**	**15.26**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**49.21**	**65.44**	**59.65**	**40.33**	**25.98**	**14.76**	**15.26**

Speciated Component Emissions	Species ID	Controlled with Carbon Adsorption?	Annual Emissions	Controlled Monthly Emissions ($L_{T,CD-i}$ lb/month) = ($P_{VA,Tla-i}$ * M_{V-i} / ($P_{VA,Tla}$ * M_V) * (1 - CD_{eff})) * L_T				
Component Name			lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	--	24.71	0.83	0.94	1.37	1.81	2.47
Benzene	2	--	0.00					
2,2,4-Trimethylpentane (isooctane)	3	--	5.77	0.18	0.20	0.30	0.41	0.58
Toluene	4	--	13.35	0.37	0.43	0.66	0.93	1.33
Ethylbenzene	5	--	2.56	0.06	0.07	0.12	0.17	0.25
Xylenes (mixed isomers)	6	--	8.97	0.21	0.26	0.41	0.60	0.89
Isopropyl benzene (Cumene)	7	--	0.94	0.02	0.03	0.04	0.06	0.09
Methyl-tert-butyl ether (MTBE)	8	--	0.00					
1,2,4-Trimethylbenzene	9	--	3.79	0.07	0.09	0.15	0.24	0.37
Cyclohexane	10	--	0.00					
Gasoline (RVP 13)	11	--	0.00					
Ethyl alcohol	12	--	0.00					
Acetaldehyde	13	--	0.00					
Methyl alcohol (Methanol)	14	--	0.00					
Naphthalene	15	--	0.35	0.01	0.01	0.01	0.02	0.03
Styrene	16	--	0.00					
Cresol (-m)	17	--	0.06	0.00	0.00	0.00	0.00	0.01
Biphenyl	18	--	0.02	0.00	0.00	0.00	0.00	0.00
Phenol	19	--	0.64	0.01	0.01	0.02	0.03	0.06
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	3.12	3.98	3.66	2.63	1.90	1.16	0.86
Benzene							
2,2,4-Trimethylpentane (isooctane)	0.75	0.98	0.89	0.62	0.43	0.25	0.18
Toluene	1.77	2.35	2.13	1.45	0.98	0.56	0.38
Ethylbenzene	0.35	0.48	0.43	0.28	0.18	0.10	0.06
Xylenes (mixed isomers)	1.23	1.68	1.51	0.99	0.63	0.34	0.22
Isopropyl benzene (Cumene)	0.13	0.18	0.16	0.10	0.07	0.03	0.02
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.54	0.76	0.68	0.42	0.25	0.13	0.08
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)							
Naphthalene	0.05	0.08	0.07	0.04	0.02	0.01	0.01
Styrene							
Cresol (-m)	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Biphenyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.10	0.15	0.13	0.07	0.04	0.01	0.01
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Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 907 Post-Project
Tank Name		TK_{name}		Pocatello Tank 907 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank Roof Type		TK_{roof}		IFR - Column Supported Roof
Normal Capacity		Cap	gal	360,864
Diameter		D	ft	42.0
Shell Height or Length		H_S	ft	0.0
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= (α_{Shell} + α_{Roof}) / 2 {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Floating Roof Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Rim-Seal System		$TK_{RimSeal}$		Vapor-mounted/None
Tank Fittings		$TK_{Fittings}$		Default
Number of fixed roof support columns		N_{Col}		1
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	0.7
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		--
Deck Type		TK_{Deck}		Welded
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	= π * D^2 / 4 {Eqn. 2-9}	A_{deck}	ft^2	1,385.4
Deck Seam Length Factor	= L_{Seam} / A_{deck} {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	6.7
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.2
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.0
Seal related wind speed exponent		n		3.0

Emission Summary				
Annual Throughput, gal	**14,870,271**	**Annual Turnovers**	**41.21**	Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.
Annual Emissions, tons	**0.05**			
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**		
Jan	7.72	0.004		
Feb	6.97	0.003		
Mar	7.72	0.004		
Apr	7.56	0.004		
May	8.00	0.004		
Jun	7.99	0.004		
Jul	8.53	0.004		
Aug	8.46	0.004		
Sep	7.88	0.004		
Oct	7.87	0.004		
Nov	7.47	0.004		
Dec	7.72	0.0039		

Calculations					1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	1,262,955	1,140,733	1,262,955	1,222,214	1,262,955
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= $[(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}	319.9	319.9	319.9	319.9	319.9
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		541	820	1,215	1,613	1,953
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = 0.14 * t_{IS} / t_{yr} {bolted deck}	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla-i}/P_{VA,Tla}))$ $M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		M_L	lb/lb-mole		188.0	188.0	188.0	188.0	188.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} = $\Sigma (M_{L-i} * Z_{Li})$ {full speciation, Eqn. 1-22}	7.10	7.10	7.10	7.10	7.10
Average Daily Minimum Ambient Temperature		T_{AN}	°F		14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F		32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= $(T_{AX} + T_{AN}) / 2$ {Eqn. 1-27}	23.30	29.10	36.30	44.90	53.55
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= $(0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}	24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= $T_{AA} + (6 * \alpha_{Tot} - 1)$ {Eqn. 1-28}	23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$	0.0031	0.0031	0.0031	0.0041	0.0057
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia		0.0031	0.0031	0.0031	0.0038	0.0052
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_f		= $(P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}	0.0001	0.0001	0.0001	0.0001	0.0001
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		L_R	lb/month	= $(K_{Ra} + K_{Rb} * v^n) * D * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}	0.19	0.17	0.19	0.23	0.32
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	= $0.943 * (Q / (42 \text{ gal/bbl})) * C_S * W_L / D * (1 + (N_{Col} * F_C / D))$ {Eqn. 2-4}	7.31	6.60	7.31	7.07	7.31
Deck Fitting Loss		L_F	lb/month	= $F_F * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}	0.22	0.20	0.22	0.26	0.37
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} = $K_D * S_D * D^2 * P_f * M_V * K_C$ {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**= $L_R + L_{WD} + L_F + L_D$ {Eqn. 2-1}**	**7.72**	**6.97**	**7.72**	**7.56**	**8.00**

	Calculatio	6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		1,222,214	1,262,955	1,262,955	1,222,214	1,262,955	1,222,214	1,262,955
Days-In-Service	Input "0" for OOS	30	31	31	30	31	30	31
Shell Clingage Factor		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	319.9	319.9	319.9	319.9	319.9	319.9	319.9
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Product Factor	Eqn. 2-3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		188.0	188.0	188.0	188.0	188.0	188.0	188.0
Liquid Density at 60 °F		7.10	7.10	7.10	7.10	7.10	7.10	7.10
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.0079	0.0101	0.0094	0.0068	0.0044	0.0031	0.0031
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	0.0072	0.0092	0.0087	0.0063	0.0042	0.0031	0.0031
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.0001	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001
Average Ambient Wind Speed	Monthly Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		0.43	0.57	0.54	0.38	0.26	0.19	0.19
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	7.07	7.31	7.31	7.07	7.31	7.07	7.31
Deck Fitting Loss		0.49	0.65	0.61	0.43	0.30	0.21	0.22
Deck Seam Loss		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**7.99**	**8.53**	**8.46**	**7.88**	**7.87**	**7.47**	**7.72**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi} (lb/lb-mol)	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$				
Component Name			lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	86.17	0.53	0.02	0.02	0.03	0.04	0.05
Benzene	2	78.11	0.00					
2,2,4-Trimethylpentane (isooctane)	3	114.23	0.13	0.01	0.01	0.01	0.01	0.01
Toluene	4	92.13	0.31	0.01	0.01	0.02	0.02	0.03
Ethylbenzene	5	106.17	0.08	0.00	0.00	0.00	0.01	0.01
Xylenes (mixed isomers)	6	106.17	0.28	0.01	0.01	0.02	0.02	0.03
Isopropyl benzene (Cumene)	7	120.2	0.04	0.00	0.00	0.00	0.00	0.00
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00					
1,2,4-Trimethylbenzene	9	120.19	0.27	0.02	0.02	0.02	0.02	0.02
Cyclohexane	10	84.16	0.00					
Gasoline (RVP 13)	11	62	0.00					
Ethyl alcohol	12	46.07	0.00					
Acetaldehyde	13	44	0.00					
Methyl alcohol (Methanol)	14	32.04	0.00					
Naphthalene	15	128.2	0.15	0.01	0.01	0.01	0.01	0.01
Styrene	16	104.15	0.00					
Cresol (-m)	17	108.1	0.04	0.00	0.00	0.00	0.00	0.00
Biphenyl	18	154.21	0.06	0.01	0.00	0.01	0.01	0.01
Phenol	19	94.11	0.24	0.02	0.02	0.02	0.02	0.02
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	0.06	0.08	0.07	0.06	0.04	0.03	0.02
Benzene							
2,2,4-Trimethylpentane (isooctane)	0.01	0.02	0.02	0.01	0.01	0.01	0.01
Toluene	0.04	0.05	0.04	0.03	0.03	0.02	0.01
Ethylbenzene	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Xylenes (mixed isomers)	0.03	0.04	0.04	0.03	0.02	0.02	0.01
Isopropyl benzene (Cumene)	0.00	0.01	0.00	0.00	0.00	0.00	0.00
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.03	0.03	0.03	0.02	0.02	0.02	0.02
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)							
Naphthalene	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Styrene							
Cresol (-m)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Biphenyl	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Phenol	0.02	0.02	0.02	0.02	0.02	0.02	0.02
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Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 908 Post-Project
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank 908 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		VFR - Cone
Normal Capacity		Cap	gal	376,614
Diameter		D	ft	42.5
Shell Height or Length		H_S	ft	40
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	42.5
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	40.0
External Shell Color		SC_{ext}		Aluminum/Specular
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Aluminum/Specular
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.39
Tank Roof Paint Solar Absorbance		α_{Roof}		0.39
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.39
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	36.5
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	0.4
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	0.06
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	51,780
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary			
Annual Throughput, gal	15,519,288	**Annual Emissions** 0.19	Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.
Annual Turnovers	40.06		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	15.01	0.008	
Feb	13.81	0.007	
Mar	16.38	0.008	
Apr	23.77	0.012	
May	35.78	0.018	
Jun	48.47	0.024	
Jul	64.54	0.032	
Aug	58.77	0.029	
Sep	39.66	0.020	
Oct	25.48	0.013	
Nov	14.41	0.007	
Dec	14.88	0.0074	

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type				= User specified		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified		1,318,077	1,190,521	1,318,077	1,275,558	1,318,077
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		18.3	18.3	18.3	18.3	18.3
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		22.2	22.2	22.2	22.2	22.2
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0337	0.0402	0.0508	0.0644	0.0746
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		0.92	0.92	0.92	0.92	0.92
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.996	0.996	0.996	0.995	0.992
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		M_L	lb/lb-mole			188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		3.40	3.07	3.40	3.29	3.40
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		21.04	26.79	33.73	41.68	49.96
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		30.40	37.97	47.85	59.56	70.67
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		18.73	22.35	28.24	35.76	41.42

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		1,275,558	1,318,077	1,318,077	1,275,558	1,318,077	1,275,558	1,318,077
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	8,907	8,907	8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	18.3	18.3	18.3	18.3	18.3	18.3	18.3
Vapor Space Outage		22.2	22.2	22.2	22.2	22.2	22.2	22.2
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0833	0.0909	0.0854	0.0731	0.0591	0.0371	0.0325
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	0.92	0.92	0.92	0.92	0.92	0.92	0.92
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.989	0.987	0.988	0.991	0.994	0.996	0.996
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		188.0	188.0	188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	3.29	3.40	3.40	3.29	3.40	3.29	3.40
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		58.65	65.79	63.68	54.44	43.91	33.11	22.44
Daily Maximum Liquid Surf. Temperature, F		81.79	91.04	87.40	74.74	60.33	43.43	31.46
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	46.27	50.49	47.43	40.59	32.84	20.62	18.04

Calculations					2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	25.72	32.38	40.79	50.62	60.32
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	24.64	30.44	37.64	46.24	54.89
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	0.0031	0.0031	0.0032	0.0046	0.0066
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia		0.0031	0.0031	0.0031	0.0033	0.0045
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia		0.0031	0.0031	0.0042	0.0064	0.0092
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}	0.001	0.001	0.002	0.003	0.004
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}	0.00008	0.00008	0.00008	0.00011	0.00015
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}	31,458	31,458	31,458	31,458	31,458
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}	2.53	2.69	3.84	6.63	11.06
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}	12.48	11.12	12.54	17.14	24.73
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**	**15.01**	**13.81**	**16.38**	**23.77**	**35.78**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**	**15.01**	**13.81**	**16.38**	**23.77**	**35.78**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	70.22	78.41	75.54	64.59	52.12	38.27	26.95
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	63.99	71.89	69.94	60.29	49.34	36.94	26.09
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.0091	0.0115	0.0107	0.0076	0.0049	0.0031	0.0031
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0062	0.0079	0.0074	0.0054	0.0036	0.0031	0.0031
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.0127	0.0166	0.0150	0.0104	0.0066	0.0036	0.0031
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.007	0.009	0.008	0.005	0.003	0.001	0.001
Vapor Density		0.00021	0.00026	0.00024	0.00018	0.00012	0.00008	0.00008
Vapor Space Volume		31,458	31,458	31,458	31,458	31,458	31,458	31,458
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	16.12	22.69	19.84	12.08	6.68	2.63	2.43
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	32.35	41.85	38.93	27.59	18.80	11.77	12.45
Total Losses	**Uncontrolled emissions.**	**48.47**	**64.54**	**58.77**	**39.66**	**25.48**	**14.41**	**14.88**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**48.47**	**64.54**	**58.77**	**39.66**	**25.48**	**14.41**	**14.88**

Speciated Component Emissions	Species ID	Controlled with Carbon Adsorption?	Annual Emissions	Controlled Monthly Emissions ($L_{T,CD-i}$ lb/month) = ($P_{VA,Tla-i}$ * M_{V-i} / ($P_{VA,Tla}$ * M_V) * (1 - CD_{eff})) * L_T				
Component Name			lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	--	24.29	0.81	0.92	1.34	1.77	2.43
Benzene	2	--	0.00					
2,2,4-Trimethylpentane (isooctane)	3	--	5.67	0.17	0.20	0.30	0.40	0.57
Toluene	4	--	13.12	0.36	0.42	0.65	0.91	1.31
Ethylbenzene	5	--	2.52	0.06	0.07	0.12	0.17	0.25
Xylenes (mixed isomers)	6	--	8.82	0.21	0.25	0.40	0.58	0.88
Isopropyl benzene (Cumene)	7	--	0.93	0.02	0.02	0.04	0.06	0.09
Methyl-tert-butyl ether (MTBE)	8	--	0.00					
1,2,4-Trimethylbenzene	9	--	3.72	0.07	0.09	0.15	0.23	0.37
Cyclohexane	10	--	0.00					
Gasoline (RVP 13)	11	--	0.00					
Ethyl alcohol	12	--	0.00					
Acetaldehyde	13	--	0.00					
Methyl alcohol (Methanol)	14	--	0.00					
Naphthalene	15	--	0.35	0.01	0.01	0.01	0.02	0.03
Styrene	16	--	0.00					
Cresol (-m)	17	--	0.06	0.00	0.00	0.00	0.00	0.01
Biphenyl	18	--	0.02	0.00	0.00	0.00	0.00	0.00
Phenol	19	--	0.63	0.01	0.01	0.02	0.03	0.06
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	3.07	3.93	3.61	2.58	1.86	1.13	0.84
Benzene							
2,2,4-Trimethylpentane (isooctane)	0.74	0.96	0.88	0.61	0.42	0.25	0.18
Toluene	1.74	2.32	2.10	1.43	0.96	0.54	0.38
Ethylbenzene	0.34	0.47	0.42	0.28	0.18	0.10	0.06
Xylenes (mixed isomers)	1.21	1.66	1.49	0.97	0.62	0.33	0.22
Isopropyl benzene (Cumene)	0.13	0.18	0.16	0.10	0.06	0.03	0.02
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.53	0.75	0.67	0.41	0.25	0.12	0.08
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)							
Naphthalene	0.05	0.07	0.07	0.04	0.02	0.01	0.01
Styrene							
Cresol (-m)	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Biphenyl	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Phenol	0.10	0.15	0.13	0.07	0.04	0.01	0.01
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Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 911 Post-Project
Tank Name		TK_{name}		Pocatello Tank 911 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank Roof Type		TK_{roof}		IFR - Self Supporting Roof
Normal Capacity		Cap	gal	796,908
Diameter		D	ft	56.5
Shell Height or Length		H_S	ft	0.0
External Shell Color		SC_{ext}		Aluminum/Specular
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Aluminum/Specular
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.39
Tank Roof Paint Solar Absorbance		α_{Roof}		0.39
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.39
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Floating Roof Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Rim-Seal System		$TK_{RimSeal}$		Mechanical-shoe/Rim-mounted
Tank Fittings		$TK_{Fittings}$		Default
Number of fixed roof support columns		N_{Col}		0
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	0.0
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		--
Deck Type		TK_{Deck}		Welded
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	$= \pi * D^2 / 4$ {Eqn. 2-9}	A_{deck}	ft^2	2,507.2
Deck Seam Length Factor	= L_{Seam} / A_{deck} {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	0.6
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.4
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.0
Seal related wind speed exponent		n		1.0

Emission Summary

Annual Throughput, gal	**32,838,515**	**Annual Turnovers**	**41.21**
Annual Emissions, tons	**0.07**		
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**	
Jan	11.96	0.006	
Feb	10.80	0.005	
Mar	11.96	0.006	
Apr	11.62	0.006	
May	12.08	0.006	
Jun	11.79	0.006	
Jul	12.29	0.006	
Aug	12.26	0.006	
Sep	11.74	0.006	
Oct	12.03	0.006	
Nov	11.57	0.006	
Dec	11.96	0.0060	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations					1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	2,789,025	2,519,119	2,789,025	2,699,056	2,789,025
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= $[(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}	194.6	194.6	194.6	194.6	194.6
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		541	820	1,215	1,613	1,953
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = 0.14 * t_{IS} / t_{yr} {bolted deck}	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla-i}/P_{VA,Tla}))$ $M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		M_L	lb/lb-mole		188.0	188.0	188.0	188.0	188.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} = $\Sigma (M_{L-i} * Z_{Li})$ {full speciation, Eqn. 1-22}	7.10	7.10	7.10	7.10	7.10
Average Daily Minimum Ambient Temperature		T_{AN}	°F		14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F		32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= $(T_{AX} + T_{AN}) / 2$ {Eqn. 1-27}	23.30	29.10	36.30	44.90	53.55
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= $(0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}	25.72	32.38	40.79	50.62	60.32
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= $T_{AA} + (6 * \alpha_{Tot} - 1)$ {Eqn. 1-28}	24.64	30.44	37.64	46.24	54.89
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$	0.0031	0.0031	0.0032	0.0046	0.0066
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia		0.0031	0.0031	0.0031	0.0040	0.0055
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_f		= $(P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}	0.0001	0.0001	0.0001	0.0001	0.0001
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		L_R	lb/month	= $(K_{Ra} + K_{Rb} * v^n) * D * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}	0.02	0.02	0.02	0.03	0.04
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	= 0.943 * (Q / (42 gal/bbl)) * C_S * W_L / D * (1 + (N_{Col} * F_C / D)) {Eqn. 2-4}	11.80	10.66	11.80	11.42	11.80
Deck Fitting Loss		L_F	lb/month	= $F_F * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}	0.13	0.12	0.13	0.16	0.23
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} = $K_D * S_D * D^2 * P_f * M_V * K_C$ {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**= $L_R + L_{WD} + L_F + L_D$ {Eqn. 2-1}**	**11.96**	**10.80**	**11.96**	**11.62**	**12.08**

	Calculatio	6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		2,699,056	2,789,025	2,789,025	2,699,056	2,789,025	2,699,056	2,789,025
Days-In-Service	Input "0" for OOS	30	31	31	30	31	30	31
Shell Clingage Factor		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	194.6	194.6	194.6	194.6	194.6	194.6	194.6
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Product Factor	Eqn. 2-3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		188.0	188.0	188.0	188.0	188.0	188.0	188.0
Liquid Density at 60 °F		7.10	7.10	7.10	7.10	7.10	7.10	7.10
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	70.22	78.41	75.54	64.59	52.12	38.27	26.95
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	63.99	71.89	69.94	60.29	49.34	36.94	26.09
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.0091	0.0115	0.0107	0.0076	0.0049	0.0031	0.0031
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	0.0075	0.0096	0.0090	0.0066	0.0044	0.0031	0.0031
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.0001	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001
Average Ambient Wind Speed	Monthly Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		0.05	0.07	0.07	0.05	0.03	0.02	0.02
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	11.42	11.80	11.80	11.42	11.80	11.42	11.80
Deck Fitting Loss		0.31	0.41	0.39	0.27	0.19	0.13	0.13
Deck Seam Loss		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**11.79**	**12.29**	**12.26**	**11.74**	**12.03**	**11.57**	**11.96**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi}	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$				
Component Name		(lb/lb-mol)	lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	86.17	0.22	0.01	0.01	0.01	0.02	0.02
Benzene	2	78.11	0.00					
2,2,4-Trimethylpentane (isooctane)	3	114.23	0.06	0.00	0.00	0.00	0.00	0.01
Toluene	4	92.13	0.18	0.01	0.01	0.01	0.01	0.02
Ethylbenzene	5	106.17	0.06	0.00	0.00	0.00	0.00	0.01
Xylenes (mixed isomers)	6	106.17	0.24	0.02	0.02	0.02	0.02	0.02
Isopropyl benzene (Cumene)	7	120.2	0.04	0.00	0.00	0.00	0.00	0.00
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00					
1,2,4-Trimethylbenzene	9	120.19	0.34	0.03	0.02	0.03	0.03	0.03
Cyclohexane	10	84.16	0.00					
Gasoline (RVP 13)	11	62	0.00					
Ethyl alcohol	12	46.07	0.00					
Acetaldehyde	13	44	0.00					
Methyl alcohol (Methanol)	14	32.04	0.00					
Naphthalene	15	128.2	0.24	0.02	0.02	0.02	0.02	0.02
Styrene	16	104.15	0.00					
Cresol (-m)	17	108.1	0.07	0.01	0.01	0.01	0.01	0.01
Biphenyl	18	154.21	0.10	0.01	0.01	0.01	0.01	0.01
Phenol	19	94.11	0.37	0.03	0.03	0.03	0.03	0.03
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	0.02	0.03	0.03	0.02	0.02	0.01	0.01
Benzene							
2,2,4-Trimethylpentane (isooctane)	0.01	0.01	0.01	0.01	0.01	0.00	0.00
Toluene	0.02	0.02	0.02	0.02	0.01	0.01	0.01
Ethylbenzene	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Xylenes (mixed isomers)	0.02	0.03	0.03	0.02	0.02	0.02	0.02
Isopropyl benzene (Cumene)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)							
Naphthalene	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Styrene							
Cresol (-m)	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Biphenyl	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Phenol	0.03	0.03	0.03	0.03	0.03	0.03	0.03
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Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 914 Post-Project
Tank Name		TK_{name}		Pocatello Tank 914 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank Roof Type		TK_{roof}		IFR - Column Supported Roof
Normal Capacity		Cap	gal	567,462
Diameter		D	ft	48.0
Shell Height or Length		H_S	ft	0.0
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= (α_{Shell} + α_{Roof}) / 2 {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Floating Roof Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Rim-Seal System		$TK_{RimSeal}$		Mechanical-shoe/Rim-mounted
Tank Fittings		$TK_{Fittings}$		Default
Number of fixed roof support columns		N_{Col}		1
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	0.7
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		--
Deck Type		TK_{Deck}		Welded
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	= π * D^2 / 4 {Eqn. 2-9}	A_{deck}	ft^2	1,809.6
Deck Seam Length Factor	= L_{Seam} / A_{deck} {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	0.6
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.4
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.0
Seal related wind speed exponent		n		1.0

Emission Summary				
Annual Throughput, gal	**33,138,591**	**Annual Turnovers**	**58.40**	Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.
Annual Emissions, tons	**2.18**			
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**		
Jan	183.36	0.092		
Feb	190.59	0.095		
Mar	252.09	0.126		
Apr	303.96	0.152		
May	396.83	0.198		
Jun	502.58	0.251		
Jul	679.61	0.340		
Aug	633.06	0.317		
Sep	448.80	0.224		
Oct	340.94	0.170		
Nov	239.72	0.120		
Dec	189.88	0.0949		

Calculations					1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	2,814,510	2,542,138	2,814,510	2,723,720	2,814,510
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= $[(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}	327.8	327.8	327.8	327.8	327.8
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		541	820	1,215	1,613	1,953
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = $0.14 * t_{IS} / t_{yr}$ {bolted deck}	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla-i}/P_{VA,Tla}))$ $M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		M_L	lb/lb-mole		92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} = $\Sigma (M_{L-i} * Z_{Li})$ {full speciation, Eqn. 1-22}	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		T_{AN}	°F		14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F		32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= $(T_{AX} + T_{AN}) / 2$ {Eqn. 1-27}	23.30	29.10	36.30	44.90	53.55
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= $(0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}	24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= $T_{AA} + (6 * \alpha_{Tot} - 1)$ {Eqn. 1-28}	23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$	4.0217	4.5740	5.3494	6.3974	7.5984
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia		3.9611	4.4721	5.1785	6.1363	7.2367
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_f		= $(P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}	0.0947	0.1099	0.1325	0.1667	0.2122
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		L_R	lb/month	= $(K_{Ra} + K_{Rb} * v^n) * D * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}	13.90	14.57	19.45	23.67	31.14
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	= $0.943 * (Q / (42 \text{ gal/bbl})) * C_S * W_L / D * (1 + (N_{Col} * F_C / D))$ {Eqn. 2-4}	11.22	10.13	11.22	10.86	11.22
Deck Fitting Loss		L_F	lb/month	= $F_F * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}	158.24	165.88	221.41	269.43	354.47
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} = $K_D * S_D * D^2 * P_f * M_V * K_C$ {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**= $L_R + L_{WD} + L_F + L_D$ {Eqn. 2-1}**	**183.36**	**190.59**	**252.09**	**303.96**	**396.83**

Parameter Title	Notes	Calculati 6	7	8	9	10	11	12
		Jun	Jul	Aug	Sep	Oct	Nov	Dec
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		2,723,720	2,814,510	2,814,510	2,723,720	2,814,510	2,723,720	2,814,510
Days-In-Service	Input "0" for OOS	30	31	31	30	31	30	31
Shell Clingage Factor		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	327.8	327.8	327.8	327.8	327.8	327.8	327.8
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Product Factor	Eqn. 2-3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		92.0	92.0	92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		5.60	5.60	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	9.0262	10.3985	9.9805	8.3159	6.6987	5.1918	4.1382
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	8.5574	9.8518	9.5189	7.9993	6.5142	5.1062	4.0842
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.2796	0.3678	0.3422	0.2490	0.1814	0.1301	0.0983
Average Ambient Wind Speed	Monthly Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		39.71	53.98	50.22	35.37	26.63	18.48	14.43
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	10.86	11.22	11.22	10.86	11.22	10.86	11.22
Deck Fitting Loss		452.01	614.41	571.62	402.57	303.09	210.38	164.23
Deck Seam Loss		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**502.58**	**679.61**	**633.06**	**448.80**	**340.94**	**239.72**	**189.88**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi}	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$				
Component Name		(lb/lb-mol)	lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	86.17	21.51	0.76	0.81	1.12	1.42	1.95
Benzene	2	78.11	13.29	0.48	0.51	0.69	0.87	1.20
2,2,4-Trimethylpentane (isooctane)	3	114.23	11.56	0.47	0.48	0.63	0.77	1.04
Toluene	4	92.13	20.14	0.92	0.92	1.17	1.37	1.78
Ethylbenzene	5	106.17	1.99	0.12	0.11	0.13	0.14	0.17
Xylenes (mixed isomers)	6	106.17	9.86	0.62	0.58	0.69	0.73	0.85
Isopropyl benzene (Cumene)	7	120.2	0.25	0.02	0.02	0.02	0.02	0.02
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00					
1,2,4-Trimethylbenzene	9	120.19	3.13	0.24	0.22	0.25	0.25	0.27
Cyclohexane	10	84.16	0.00					
Gasoline (RVP 13)	11	62	0.00					
Ethyl alcohol	12	46.07	0.00					
Acetaldehyde	13	44	0.00					
Methyl alcohol (Methanol)	14	32.04	1.76	0.06	0.06	0.08	0.11	0.16
Naphthalene	15	128.2	0.41	0.03	0.03	0.03	0.03	0.03
Styrene	16	104.15	0.15	0.01	0.01	0.01	0.01	0.01
Cresol (-m)	17	108.1	0.00					
Biphenyl	18	154.21	0.00					
Phenol	19	94.11	0.00					
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	2.62	3.71	3.41	2.27	1.61	1.05	0.79
Benzene	1.61	2.29	2.10	1.40	0.99	0.65	0.50
2,2,4-Trimethylpentane (isooctane)	1.36	1.91	1.76	1.19	0.87	0.60	0.48
Toluene	2.29	3.17	2.92	2.02	1.52	1.11	0.94
Ethylbenzene	0.20	0.26	0.24	0.18	0.16	0.13	0.12
Xylenes (mixed isomers)	0.98	1.25	1.18	0.91	0.78	0.66	0.63
Isopropyl benzene (Cumene)	0.02	0.03	0.03	0.02	0.02	0.02	0.02
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.28	0.31	0.30	0.27	0.26	0.24	0.24
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)	0.22	0.32	0.29	0.19	0.13	0.08	0.06
Naphthalene	0.03	0.04	0.04	0.03	0.03	0.03	0.03
Styrene	0.01	0.02	0.02	0.01	0.01	0.01	0.01
Cresol (-m)							
Biphenyl							
Phenol							
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Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 915 Post-Project
Tank Name		TK_{name}		Pocatello Tank 915 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank Roof Type		TK_{roof}		IFR - Column Supported Roof
Normal Capacity		Cap	gal	378,168
Diameter		D	ft	40.0
Shell Height or Length		H_S	ft	0.0
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= (α_{Shell} + α_{Roof}) / 2 {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Floating Roof Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Rim-Seal System		$TK_{RimSeal}$		Vapor-mounted/Rim-mounted
Tank Fittings		$TK_{Fittings}$		Detail
Number of fixed roof support columns		N_{Col}		1
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	0.7
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		--
Deck Type		TK_{Deck}		Welded
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	= π * D^2 / 4 {Eqn. 2-9}	A_{deck}	ft^2	1,256.6
Deck Seam Length Factor	= L_{Seam} / A_{deck} {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	2.2
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.0
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.0
Seal related wind speed exponent		n		4.3

Emission Summary

Annual Throughput, gal	**22,084,218**	**Annual Turnovers**	**58.40**
Annual Emissions, tons	**2.62**		

Month	Normal Operation Loss, lbs	Emissions, tpy
Jan	217.61	0.109
Feb	226.81	0.113
Mar	300.90	0.150
Apr	363.91	0.182
May	476.31	0.238
Jun	604.60	0.302
Jul	819.00	0.409
Aug	762.58	0.381
Sep	539.43	0.270
Oct	408.57	0.204
Nov	286.06	0.143
Dec	225.51	0.1128

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations					1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	1,875,646	1,694,132	1,875,646	1,815,141	1,875,646
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= $[(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}	344.2	344.2	344.2	344.2	344.2
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		541	820	1,215	1,613	1,953
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = 0.14 * t_{IS} / t_{yr} {bolted deck}	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla-i}/P_{VA,Tla}))$ $M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		M_L	lb/lb-mole		92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} = $\Sigma (M_{L-i} * Z_{Li})$ {full speciation, Eqn. 1-22}	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		T_{AN}	°F		14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F		32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= $(T_{AX} + T_{AN}) / 2$ {Eqn. 1-27}	23.30	29.10	36.30	44.90	53.55
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= $(0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}	24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= $T_{AA} + (6 * \alpha_{Tot} - 1)$ {Eqn. 1-28}	23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$	4.0217	4.5740	5.3494	6.3974	7.5984
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia		3.9611	4.4721	5.1785	6.1363	7.2367
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_I		= $(P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}	0.0947	0.1099	0.1325	0.1667	0.2122
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		L_R	lb/month	= $(K_{Ra} + K_{Rb} * v^n) * D * P_I * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}	42.48	44.53	59.44	72.33	95.16
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	= $0.943 * (Q / (42 \text{ gal/bbl})) * C_S * W_L / D * (1 + (N_{Col} * F_C / D))$ {Eqn. 2-4}	9.00	8.13	9.00	8.71	9.00
Deck Fitting Loss		L_F	lb/month	= $F_F * P_I * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}	166.13	174.15	232.46	282.87	372.15
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} = $K_D * S_D * D^2 * P_I * M_V * K_C$ {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**= $L_R + L_{WD} + L_F + L_D$ {Eqn. 2-1}**	**217.61**	**226.81**	**300.90**	**363.91**	**476.31**

	Calculatio	6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		1,815,141	1,875,646	1,875,646	1,815,141	1,875,646	1,815,141	1,875,646
Days-In-Service	Input "0" for OOS	30	31	31	30	31	30	31
Shell Clingage Factor		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	344.2	344.2	344.2	344.2	344.2	344.2	344.2
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Product Factor	Eqn. 2-3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		92.0	92.0	92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		5.60	5.60	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	9.0262	10.3985	9.9805	8.3159	6.6987	5.1918	4.1382
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	8.5574	9.8518	9.5189	7.9993	6.5142	5.1062	4.0842
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.2796	0.3678	0.3422	0.2490	0.1814	0.1301	0.0983
Average Ambient Wind Speed	Monthly Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		121.34	164.94	153.46	108.07	81.37	56.48	44.09
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	8.71	9.00	9.00	8.71	9.00	8.71	9.00
Deck Fitting Loss		474.55	645.06	600.13	422.65	318.21	220.88	172.42
Deck Seam Loss		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**604.60**	**819.00**	**762.58**	**539.43**	**408.57**	**286.06**	**225.51**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi} (lb/lb-mol)	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$				
Component Name			lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	86.17	25.34	0.85	0.93	1.29	1.66	2.30
Benzene	2	78.11	15.40	0.52	0.56	0.78	1.00	1.40
2,2,4-Trimethylpentane (isooctane)	3	114.23	12.94	0.48	0.50	0.68	0.85	1.16
Toluene	4	92.13	21.57	0.88	0.89	1.17	1.43	1.92
Ethylbenzene	5	106.17	1.91	0.10	0.10	0.12	0.13	0.17
Xylenes (mixed isomers)	6	106.17	9.28	0.53	0.50	0.61	0.66	0.81
Isopropyl benzene (Cumene)	7	120.2	0.23	0.01	0.01	0.02	0.02	0.02
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00					
1,2,4-Trimethylbenzene	9	120.19	2.64	0.20	0.18	0.20	0.21	0.23
Cyclohexane	10	84.16	0.00					
Gasoline (RVP 13)	11	62	0.00					
Ethyl alcohol	12	46.07	0.00					
Acetaldehyde	13	44	0.00					
Methyl alcohol (Methanol)	14	32.04	2.06	0.06	0.07	0.10	0.13	0.19
Naphthalene	15	128.2	0.33	0.03	0.02	0.03	0.03	0.03
Styrene	16	104.15	0.13	0.01	0.01	0.01	0.01	0.01
Cresol (-m)	17	108.1	0.00					
Biphenyl	18	154.21	0.00					
Phenol	19	94.11	0.00					
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	3.11	4.44	4.07	2.69	1.89	1.21	0.89
Benzene	1.89	2.72	2.49	1.63	1.14	0.73	0.54
2,2,4-Trimethylpentane (isooctane)	1.56	2.22	2.04	1.35	0.96	0.64	0.49
Toluene	2.54	3.60	3.30	2.21	1.60	1.11	0.90
Ethylbenzene	0.20	0.27	0.25	0.18	0.15	0.12	0.10
Xylenes (mixed isomers)	0.97	1.29	1.20	0.88	0.72	0.58	0.54
Isopropyl benzene (Cumene)	0.02	0.03	0.03	0.02	0.02	0.02	0.01
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.24	0.28	0.27	0.23	0.22	0.20	0.20
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)	0.26	0.39	0.35	0.22	0.15	0.09	0.06
Naphthalene	0.03	0.03	0.03	0.03	0.03	0.03	0.03
Styrene	0.01	0.02	0.02	0.01	0.01	0.01	0.01
Cresol (-m)							
Biphenyl							
Phenol							
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Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 916 Post-Project
Tank Name		TK_{name}		Pocatello Tank 916 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank Roof Type		TK_{roof}		IFR - Column Supported Roof
Normal Capacity		Cap	gal	669,522
Diameter		D	ft	52.5
Shell Height or Length		H_S	ft	0.0
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= (α_{Shell} + α_{Roof}) / 2 {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Floating Roof Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Rim-Seal System		$TK_{RimSeal}$		Mechanical-shoe/Shoe-mounted
Tank Fittings		$TK_{Fittings}$		Default
Number of fixed roof support columns		N_{Col}		1
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	0.7
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		--
Deck Type		TK_{Deck}		Welded
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	= π * D^2 / 4 {Eqn. 2-9}	A_{deck}	ft^2	2,164.8
Deck Seam Length Factor	= L_{Seam} / A_{deck} {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	1.6
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.3
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.0
Seal related wind speed exponent		n		1.6

Emission Summary				
Annual Throughput, gal	**41,200,110**	**Annual Turnovers**	**61.54**	Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.
Annual Emissions, tons	**0.18**			
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**		
Jan	20.56	0.010		
Feb	19.88	0.010		
Mar	24.29	0.012		
Apr	26.96	0.013		
May	32.64	0.016		
Jun	38.08	0.019		
Jul	46.97	0.023		
Aug	44.91	0.022		
Sep	35.21	0.018		
Oct	29.42	0.015		
Nov	23.26	0.012		
Dec	20.89	0.0104		

Calculations					1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	Ethyl alcohol	Ethyl alcohol	Ethyl alcohol	Ethyl alcohol	Ethyl alcohol
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Denatured Ethanol	Denatured Ethanol	Denatured Ethanol	Denatured Ethanol	Denatured Ethanol
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	3,499,187	3,160,556	3,499,187	3,386,310	3,499,187
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= $[(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}	335.7	335.7	335.7	335.7	335.7
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		541	820	1,215	1,613	1,953
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = $0.14 * t_{IS} / t_{yr}$ {bolted deck}	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla-i}/P_{VA,Tla}))$ $M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}	46.1	46.1	46.1	46.1	46.1
Liquid Molecular Weight		M_L	lb/lb-mole		46.1	46.1	46.1	46.1	46.1
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} $= \Sigma (M_{L-i} * Z_{Li})$ {full speciation, Eqn. 1-22}	6.61	6.61	6.61	6.61	6.61
Average Daily Minimum Ambient Temperature		T_{AN}	°F		14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F		32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= $(T_{AX} + T_{AN}) / 2$ {Eqn. 1-27}	23.30	29.10	36.30	44.90	53.55
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= $(0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}	24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= $T_{AA} + (6 * \alpha_{Tot} - 1)$ {Eqn. 1-28}	23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$	0.1722	0.2203	0.2969	0.4167	0.5764
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia		0.1673	0.2110	0.2791	0.3851	0.5259
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_f		= $(P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}	0.0034	0.0042	0.0056	0.0078	0.0107
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		L_R	lb/month	= $(K_{Ra} + K_{Rb} * v^n) * D * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}	1.10	1.26	1.85	2.48	3.52
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	= $0.943 * (Q / (42 \text{ gal/bbl})) * C_S * W_L / D * (1 + (N_{Col} * F_C / D))$ {Eqn. 2-4}	15.04	13.58	15.04	14.55	15.04
Deck Fitting Loss		L_F	lb/month	= $F_F * P_f * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}	4.42	5.04	7.40	9.92	14.08
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} = $K_D * S_D * D^2 * P_f * M_V * K_C$ {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**= $L_R + L_{WD} + L_F + L_D$ {Eqn. 2-1}**	**20.56**	**19.88**	**24.29**	**26.96**	**32.64**

	Calculatio	6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Ethyl alcohol	Ethyl alcohol	Ethyl alcohol	Ethyl alcohol	Ethyl alcohol	Ethyl alcohol	Ethyl alcohol
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Denatured Ethanol	Denatured Ethanol	Denatured Ethanol	Denatured Ethanol	Denatured Ethanol	Denatured Ethanol	Denatured Ethanol
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		3,386,310	3,499,187	3,499,187	3,386,310	3,499,187	3,386,310	3,499,187
Days-In-Service	Input "0" for OOS	30	31	31	30	31	30	31
Shell Clingage Factor		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	335.7	335.7	335.7	335.7	335.7	335.7	335.7
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Product Factor	Eqn. 2-3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	46.1	46.1	46.1	46.1	46.1	46.1	46.1
Liquid Molecular Weight		46.1	46.1	46.1	46.1	46.1	46.1	46.1
Liquid Density at 60 °F		6.61	6.61	6.61	6.61	6.61	6.61	6.61
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.7962	1.0370	0.9606	0.6829	0.4546	0.2805	0.1819
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	0.7205	0.9376	0.8793	0.6349	0.4312	0.2717	0.1774
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.0148	0.0194	0.0182	0.0130	0.0088	0.0055	0.0036
Average Ambient Wind Speed	Monthly Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		4.71	6.39	5.98	4.14	2.88	1.74	1.17
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	14.55	15.04	15.04	14.55	15.04	14.55	15.04
Deck Fitting Loss		18.82	25.54	23.90	16.53	11.50	6.97	4.68
Deck Seam Loss		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**38.08**	**46.97**	**44.91**	**35.21**	**29.42**	**23.26**	**20.89**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi}	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$				
Component Name		(lb/lb-mol)	lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	86.17	0.28	0.01	0.01	0.02	0.02	0.03
Benzene	2	78.11	0.19	0.01	0.01	0.01	0.01	0.02
2,2,4-Trimethylpentane (isooctane)	3	114.23	0.20	0.01	0.01	0.01	0.01	0.02
Toluene	4	92.13	0.41	0.03	0.03	0.03	0.03	0.04
Ethylbenzene	5	106.17	0.06	0.00	0.00	0.00	0.00	0.00
Xylenes (mixed isomers)	6	106.17	0.29	0.02	0.02	0.02	0.02	0.02
Isopropyl benzene (Cumene)	7	120.2	0.01	0.00	0.00	0.00	0.00	0.00
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00					
1,2,4-Trimethylbenzene	9	120.19	0.11	0.01	0.01	0.01	0.01	0.01
Cyclohexane	10	84.16	0.00					
Gasoline (RVP 13)	11	62	0.00					
Ethyl alcohol	12	46.07	352.67	19.97	19.31	23.59	26.18	31.71
Acetaldehyde	13	44	0.00					
Methyl alcohol (Methanol)	14	32.04	0.02	0.00	0.00	0.00	0.00	0.00
Naphthalene	15	128.2	0.02	0.00	0.00	0.00	0.00	0.00
Styrene	16	104.15	0.00	0.00	0.00	0.00	0.00	0.00
Cresol (-m)	17	108.1	0.00					
Biphenyl	18	154.21	0.00					
Phenol	19	94.11	0.00					
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	0.03	0.04	0.04	0.03	0.02	0.02	0.01
Benzene	0.02	0.02	0.02	0.02	0.02	0.01	0.01
2,2,4-Trimethylpentane (isooctane)	0.02	0.02	0.02	0.02	0.02	0.01	0.01
Toluene	0.04	0.05	0.04	0.04	0.03	0.03	0.03
Ethylbenzene	0.00	0.01	0.01	0.00	0.00	0.00	0.00
Xylenes (mixed isomers)	0.03	0.03	0.03	0.02	0.02	0.02	0.02
Isopropyl benzene (Cumene)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol	36.99	45.63	43.63	34.20	28.57	22.60	20.29
Acetaldehyde							
Methyl alcohol (Methanol)	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Naphthalene	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Styrene	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Cresol (-m)							
Biphenyl							
Phenol							
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Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 917 Post-Project
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank 917 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		VFR - Cone
Normal Capacity		Cap	gal	798,294
Diameter		D	ft	60
Shell Height or Length		H_S	ft	40
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	60.0
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	40.0
External Shell Color		SC_{ext}		Aluminum/Specular
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Aluminum/Specular
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.39
Tank Roof Paint Solar Absorbance		α_{Roof}		0.39
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.39
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	38.0
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= S_R * (D / 2) / 3 {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	0.6
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	0.06
Tank Maximum Liquid Volume	= π/4 * D_E^2 * H_{LX} {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	107,442
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary

Annual Throughput, gal	32,895,629	**Annual Emissions**	0.38
Annual Turnovers	40.92		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	30.92	0.015	
Feb	28.40	0.014	
Mar	33.57	0.017	
Apr	48.58	0.024	
May	72.98	0.036	
Jun	98.70	0.049	
Jul	131.24	0.066	
Aug	119.63	0.060	
Sep	80.92	0.040	
Oct	52.14	0.026	
Nov	29.64	0.015	
Dec	30.66	0.0153	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type				= User specified		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified		2,793,875	2,523,500	2,793,875	2,703,750	2,793,875
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		19.0	19.0	19.0	19.0	19.0
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		21.6	21.6	21.6	21.6	21.6
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0337	0.0402	0.0508	0.0644	0.0746
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		0.90	0.90	0.90	0.90	0.90
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.996	0.996	0.996	0.995	0.993
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		M_L	lb/lb-mole			188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		3.48	3.14	3.48	3.36	3.48
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		21.04	26.79	33.73	41.68	49.96
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		30.40	37.97	47.85	59.56	70.67
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		18.73	22.35	28.24	35.76	41.42

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		2,703,750	2,793,875	2,793,875	2,703,750	2,793,875	2,703,750	2,793,875
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	8,907	8,907	8,907	8,907	8,907	8,907	8,907
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	19.0	19.0	19.0	19.0	19.0	19.0	19.0
Vapor Space Outage		21.6	21.6	21.6	21.6	21.6	21.6	21.6
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0833	0.0909	0.0854	0.0731	0.0591	0.0371	0.0325
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	0.90	0.90	0.90	0.90	0.90	0.90	0.90
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.990	0.987	0.988	0.991	0.994	0.996	0.996
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		188.0	188.0	188.0	188.0	188.0	188.0	188.0
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	3.36	3.48	3.48	3.36	3.48	3.36	3.48
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		58.65	65.79	63.68	54.44	43.91	33.11	22.44
Daily Maximum Liquid Surf. Temperature, F		81.79	91.04	87.40	74.74	60.33	43.43	31.46
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	46.27	50.49	47.43	40.59	32.84	20.62	18.04

Calculations					2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	25.72	32.38	40.79	50.62	60.32
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	24.64	30.44	37.64	46.24	54.89
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	0.0031	0.0031	0.0032	0.0046	0.0066
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia		0.0031	0.0031	0.0031	0.0033	0.0045
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia		0.0031	0.0031	0.0042	0.0064	0.0092
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}	0.001	0.001	0.002	0.003	0.004
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}	0.00008	0.00008	0.00008	0.00011	0.00015
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}	61,073	61,073	61,073	61,073	61,073
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}	4.92	5.23	7.45	12.88	21.48
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}	26.00	23.16	26.12	35.70	51.51
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**	**30.92**	**28.40**	**33.57**	**48.58**	**72.98**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**	**30.92**	**28.40**	**33.57**	**48.58**	**72.98**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	70.22	78.41	75.54	64.59	52.12	38.27	26.95
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	63.99	71.89	69.94	60.29	49.34	36.94	26.09
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.0091	0.0115	0.0107	0.0076	0.0049	0.0031	0.0031
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0062	0.0079	0.0074	0.0054	0.0036	0.0031	0.0031
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.0127	0.0166	0.0150	0.0104	0.0066	0.0036	0.0031
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.007	0.009	0.008	0.005	0.003	0.001	0.001
Vapor Density		0.00021	0.00026	0.00024	0.00018	0.00012	0.00008	0.00008
Vapor Space Volume		61,073	61,073	61,073	61,073	61,073	61,073	61,073
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	31.30	44.06	38.54	23.45	12.97	5.11	4.73
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	67.39	87.18	81.09	57.46	39.17	24.52	25.93
Total Losses	**Uncontrolled emissions.**	**98.70**	**131.24**	**119.63**	**80.92**	**52.14**	**29.64**	**30.66**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**98.70**	**131.24**	**119.63**	**80.92**	**52.14**	**29.64**	**30.66**

Speciated Component Emissions	Species ID	Controlled with Carbon Adsorption?	Annual Emissions	Controlled Monthly Emissions ($L_{T,CD-i}$ lb/month) = ($P_{VA,Tla-i}$ * M_{V-i} / ($P_{VA,Tla}$ * M_V) * (1 - CD_{eff})) * L_T				
Component Name			lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	--	49.58	1.68	1.88	2.74	3.62	4.95
Benzene	2	--	0.00					
2,2,4-Trimethylpentane (isooctane)	3	--	11.58	0.35	0.40	0.61	0.82	1.16
Toluene	4	--	26.78	0.75	0.87	1.33	1.86	2.67
Ethylbenzene	5	--	5.13	0.12	0.15	0.24	0.34	0.51
Xylenes (mixed isomers)	6	--	18.00	0.43	0.52	0.82	1.20	1.79
Isopropyl benzene (Cumene)	7	--	1.89	0.04	0.05	0.08	0.12	0.19
Methyl-tert-butyl ether (MTBE)	8	--	0.00					
1,2,4-Trimethylbenzene	9	--	7.60	0.15	0.19	0.31	0.48	0.75
Cyclohexane	10	--	0.00					
Gasoline (RVP 13)	11	--	0.00					
Ethyl alcohol	12	--	0.00					
Acetaldehyde	13	--	0.00					
Methyl alcohol (Methanol)	14	--	0.00					
Naphthalene	15	--	0.71	0.01	0.02	0.03	0.04	0.07
Styrene	16	--	0.00					
Cresol (-m)	17	--	0.12	0.00	0.00	0.00	0.01	0.01
Biphenyl	18	--	0.05	0.00	0.00	0.00	0.00	0.00
Phenol	19	--	1.28	0.01	0.02	0.04	0.07	0.12
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	6.25	7.98	7.34	5.27	3.80	2.33	1.73
Benzene							
2,2,4-Trimethylpentane (isooctane)	1.50	1.96	1.79	1.25	0.87	0.51	0.36
Toluene	3.55	4.71	4.27	2.91	1.97	1.12	0.77
Ethylbenzene	0.70	0.96	0.86	0.56	0.36	0.20	0.13
Xylenes (mixed isomers)	2.46	3.38	3.03	1.98	1.27	0.68	0.45
Isopropyl benzene (Cumene)	0.26	0.37	0.33	0.21	0.13	0.07	0.04
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	1.08	1.53	1.36	0.84	0.51	0.25	0.16
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)							
Naphthalene	0.10	0.15	0.13	0.08	0.05	0.02	0.01
Styrene							
Cresol (-m)	0.02	0.03	0.02	0.01	0.01	0.00	0.00
Biphenyl	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Phenol	0.20	0.31	0.26	0.14	0.07	0.03	0.01
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Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 918 Post-Project
Tank Name		TK_{name}		Pocatello Tank 918 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank Roof Type		TK_{roof}		IFR - Column Supported Roof
Normal Capacity		Cap	gal	807,072
Diameter		D	ft	52.5
Shell Height or Length		H_S	ft	0.0
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= (α_{Shell} + α_{Roof}) / 2 {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Floating Roof Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Rim-Seal System		$TK_{RimSeal}$		Vapor-mounted/None
Tank Fittings		$TK_{Fittings}$		Detail
Number of fixed roof support columns		N_{Col}		1
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	0.7
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		--
Deck Type		TK_{Deck}		Welded
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	= π * D^2 / 4 {Eqn. 2-9}	A_{deck}	ft^2	2,164.8
Deck Seam Length Factor	= L_{Seam} / A_{deck} {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	6.7
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.2
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.0
Seal related wind speed exponent		n		3.0

Emission Summary

Annual Throughput, gal	**33,257,348**	**Annual Turnovers**	**41.21**
Annual Emissions, tons	**0.08**		
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**	
Jan	13.51	0.007	
Feb	12.20	0.006	
Mar	13.51	0.007	
Apr	13.17	0.007	
May	13.83	0.007	
Jun	13.67	0.007	
Jul	14.43	0.007	
Aug	14.35	0.007	
Sep	13.54	0.007	
Oct	13.68	0.007	
Nov	13.07	0.007	
Dec	13.51	0.0068	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations					1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	2,824,597	2,551,249	2,824,597	2,733,481	2,824,597
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= [(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + … + (N_{Fnf} * K_{Fnf})] {Eqn. 2-6}	335.7	335.7	335.7	335.7	335.7
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		541	820	1,215	1,613	1,953
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = 0.14 * t_{IS} / t_{yr} {bolted deck}	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		M_L	lb/lb-mole		188.0	188.0	188.0	188.0	188.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} = Σ (M_{L-i} * Z_{Li}) {full speciation, Eqn. 1-22}	7.10	7.10	7.10	7.10	7.10
Average Daily Minimum Ambient Temperature		T_{AN}	°F		14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F		32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}	23.30	29.10	36.30	44.90	53.55
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	0.0031	0.0031	0.0031	0.0041	0.0057
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia		0.0031	0.0031	0.0031	0.0038	0.0052
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_I		= ($P_{VA,Tb}$ / P_A) / (1 + (1 - $P_{VA,Tb}$ / P_A)$^{0.5}$)^2 {Eqn. 2-3}	0.0001	0.0001	0.0001	0.0001	0.0001
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		L_R	lb/month	= (K_{Ra} + K_{Rb} * v^n) * D * P_I * M_V * K_C * t_{IS} / t_{yr} {Eqn. 2-2}	0.24	0.22	0.24	0.28	0.40
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	= 0.943 * (Q / (42 gal/bbl)) * C_S * W_L / D * (1 + (N_{Col} * F_C / D)) {Eqn. 2-4}	13.04	11.77	13.04	12.62	13.04
Deck Fitting Loss		L_F	lb/month	= F_F * P_I * M_V * K_C * t_{IS} / t_{yr} {Eqn 2-5}	0.23	0.21	0.23	0.27	0.39
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} = K_D * S_D * D^2 * P_I * M_V * K_C {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**= L_R + L_{WD} + L_F + L_D {Eqn. 2-1}**	**13.51**	**12.20**	**13.51**	**13.17**	**13.83**

	Calculatio	6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2	Distillate fuel oil no. 2
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello	Diesel - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		2,733,481	2,824,597	2,824,597	2,733,481	2,824,597	2,733,481	2,824,597
Days-In-Service	Input "0" for OOS	30	31	31	30	31	30	31
Shell Clingage Factor		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	335.7	335.7	335.7	335.7	335.7	335.7	335.7
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Product Factor	Eqn. 2-3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	130.0	130.0	130.0	130.0	130.0	130.0	130.0
Liquid Molecular Weight		188.0	188.0	188.0	188.0	188.0	188.0	188.0
Liquid Density at 60 °F		7.10	7.10	7.10	7.10	7.10	7.10	7.10
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.0079	0.0101	0.0094	0.0068	0.0044	0.0031	0.0031
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	0.0072	0.0092	0.0087	0.0063	0.0042	0.0031	0.0031
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.0001	0.0002	0.0002	0.0001	0.0001	0.0001	0.0001
Average Ambient Wind Speed	Monthly Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		0.54	0.71	0.67	0.47	0.33	0.23	0.24
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	12.62	13.04	13.04	12.62	13.04	12.62	13.04
Deck Fitting Loss		0.51	0.68	0.64	0.45	0.31	0.22	0.23
Deck Seam Loss		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**13.67**	**14.43**	**14.35**	**13.54**	**13.68**	**13.07**	**13.51**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi}	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$				
Component Name		(lb/lb-mol)	lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	86.17	0.62	0.03	0.03	0.04	0.04	0.06
Benzene	2	78.11	0.00					
2,2,4-Trimethylpentane (isooctane)	3	114.23	0.15	0.01	0.01	0.01	0.01	0.01
Toluene	4	92.13	0.39	0.02	0.02	0.02	0.03	0.04
Ethylbenzene	5	106.17	0.10	0.01	0.01	0.01	0.01	0.01
Xylenes (mixed isomers)	6	106.17	0.39	0.02	0.02	0.03	0.03	0.04
Isopropyl benzene (Cumene)	7	120.2	0.06	0.00	0.00	0.00	0.00	0.01
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00					
1,2,4-Trimethylbenzene	9	120.19	0.43	0.03	0.03	0.03	0.03	0.04
Cyclohexane	10	84.16	0.00					
Gasoline (RVP 13)	11	62	0.00					
Ethyl alcohol	12	46.07	0.00					
Acetaldehyde	13	44	0.00					
Methyl alcohol (Methanol)	14	32.04	0.00					
Naphthalene	15	128.2	0.27	0.02	0.02	0.02	0.02	0.02
Styrene	16	104.15	0.00					
Cresol (-m)	17	108.1	0.08	0.01	0.01	0.01	0.01	0.01
Biphenyl	18	154.21	0.11	0.01	0.01	0.01	0.01	0.01
Phenol	19	94.11	0.41	0.03	0.03	0.03	0.03	0.04
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	0.07	0.09	0.08	0.06	0.05	0.04	0.03
Benzene							
2,2,4-Trimethylpentane (isooctane)	0.02	0.02	0.02	0.02	0.01	0.01	0.01
Toluene	0.04	0.06	0.05	0.04	0.03	0.02	0.02
Ethylbenzene	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Xylenes (mixed isomers)	0.04	0.05	0.05	0.04	0.03	0.03	0.02
Isopropyl benzene (Cumene)	0.01	0.01	0.01	0.01	0.00	0.00	0.00
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.04	0.04	0.04	0.04	0.04	0.03	0.03
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)							
Naphthalene	0.02	0.02	0.02	0.02	0.02	0.02	0.02
Styrene							
Cresol (-m)	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Biphenyl	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Phenol	0.03	0.04	0.04	0.03	0.03	0.03	0.03
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Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

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Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 919 Post-Project
Tank Name		TK_{name}		Pocatello Tank 919 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank Roof Type		TK_{roof}		IFR - Column Supported Roof
Normal Capacity		Cap	gal	764,106
Diameter		D	ft	60.0
Shell Height or Length		H_S	ft	0.0
External Shell Color		SC_{ext}		Aluminum/Specular
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Aluminum/Specular
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.39
Tank Roof Paint Solar Absorbance		α_{Roof}		0.39
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.39
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Floating Roof Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Rim-Seal System		$TK_{RimSeal}$		Mechanical-shoe/Rim-mounted
Tank Fittings		$TK_{Fittings}$		Detail
Number of fixed roof support columns		N_{Col}		1
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	0.7
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		--
Deck Type		TK_{Deck}		Welded
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	$= \pi * D^2 / 4$ {Eqn. 2-9}	A_{deck}	ft^2	2,827.4
Deck Seam Length Factor	= L_{Seam} / A_{deck} {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	0.6
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.4
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.0
Seal related wind speed exponent		n		1.0

Emission Summary

Annual Throughput, gal	**44,622,188**	**Annual Turnovers**	**58.40**
Annual Emissions, tons	**2.66**		
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**	
Jan	221.17	0.111	
Feb	230.16	0.115	
Mar	304.91	0.152	
Apr	368.50	0.184	
May	482.61	0.241	
Jun	614.46	0.307	
Jul	838.23	0.419	
Aug	778.62	0.389	
Sep	547.33	0.274	
Oct	413.74	0.207	
Nov	289.91	0.145	
Dec	229.10	0.1145	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations					1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	3,789,830	3,423,072	3,789,830	3,667,577	3,789,830
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= [(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + … + (N_{Fnf} * K_{Fnf})] {Eqn. 2-6}	382.8	382.8	382.8	382.8	382.8
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		541	820	1,215	1,613	1,953
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = 0.14 * t_{IS} / t_{yr} {bolted deck}	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		M_L	lb/lb-mole		92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} = Σ (M_{L-i} * Z_{Li}) {full speciation, Eqn. 1-22}	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		T_{AN}	°F		14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F		32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}	23.30	29.10	36.30	44.90	53.55
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	25.72	32.38	40.79	50.62	60.32
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	24.64	30.44	37.64	46.24	54.89
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	4.1664	4.7815	5.6605	6.8453	8.1993
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia		4.0731	4.5955	5.3172	6.2950	7.4175
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_f		= ($P_{VA,Tb}$ / P_A) / (1 + (1 - $P_{VA,Tb}$ / P_A)$^{0.5}$)^2 {Eqn. 2-3}	0.0980	0.1138	0.1372	0.1728	0.2205
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		L_R	lb/month	= (K_{Ra} + K_{Rb} * v^n) * D * P_f * M_V * K_C * t_{IS} / t_{yr} {Eqn. 2-2}	17.98	18.85	25.17	30.67	40.45
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	= 0.943 * (Q / (42 gal/bbl)) * C_S * W_L / D * (1 + (N_{Col} * F_C / D)) {Eqn. 2-4}	12.05	10.89	12.05	11.66	12.05
Deck Fitting Loss		L_F	lb/month	= F_F * P_f * M_V * K_C * t_{IS} / t_{yr} {Eqn 2-5}	191.15	200.43	267.69	326.16	430.11
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} = K_D * S_D * D^2 * P_f * M_V * K_C {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**= L_R + L_{WD} + L_F + L_D {Eqn. 2-1}**	**221.17**	**230.16**	**304.91**	**368.50**	**482.61**

	Calculatio	6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		3,667,577	3,789,830	3,789,830	3,667,577	3,789,830	3,667,577	3,789,830
Days-In-Service	Input "0" for OOS	30	31	31	30	31	30	31
Shell Clingage Factor		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	382.8	382.8	382.8	382.8	382.8	382.8	382.8
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Product Factor	Eqn. 2-3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		92.0	92.0	92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		5.60	5.60	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	70.22	78.41	75.54	64.59	52.12	38.27	26.95
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	63.99	71.89	69.94	60.29	49.34	36.94	26.09
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	9.7913	11.2846	10.7420	8.8592	7.0427	5.3844	4.2753
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	8.7638	10.0823	9.7433	8.1950	6.6806	5.2433	4.1989
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.2919	0.3871	0.3592	0.2594	0.1882	0.1347	0.1017
Average Ambient Wind Speed	Monthly Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		51.82	71.02	65.89	46.05	34.53	23.92	18.66
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	11.66	12.05	12.05	11.66	12.05	11.66	12.05
Deck Fitting Loss		550.98	755.16	700.67	489.62	367.16	254.33	198.39
Deck Seam Loss		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**614.46**	**838.23**	**778.62**	**547.33**	**413.74**	**289.91**	**229.10**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi}	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$				
Component Name		(lb/lb-mol)	lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	86.17	26.77	0.91	0.98	1.37	1.75	2.43
Benzene	2	78.11	16.52	0.57	0.61	0.84	1.08	1.50
2,2,4-Trimethylpentane (isooctane)	3	114.23	14.20	0.54	0.57	0.76	0.94	1.28
Toluene	4	92.13	24.42	1.05	1.06	1.37	1.64	2.17
Ethylbenzene	5	106.17	2.31	0.13	0.13	0.15	0.17	0.20
Xylenes (mixed isomers)	6	106.17	11.37	0.68	0.64	0.77	0.83	0.99
Isopropyl benzene (Cumene)	7	120.2	0.28	0.02	0.02	0.02	0.02	0.02
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00					
1,2,4-Trimethylbenzene	9	120.19	3.44	0.26	0.24	0.27	0.27	0.29
Cyclohexane	10	84.16	0.00					
Gasoline (RVP 13)	11	62	0.00					
Ethyl alcohol	12	46.07	0.00					
Acetaldehyde	13	44	0.00					
Methyl alcohol (Methanol)	14	32.04	2.23	0.07	0.07	0.10	0.14	0.20
Naphthalene	15	128.2	0.44	0.04	0.03	0.04	0.04	0.04
Styrene	16	104.15	0.17	0.01	0.01	0.01	0.01	0.01
Cresol (-m)	17	108.1	0.00					
Biphenyl	18	154.21	0.00					
Phenol	19	94.11	0.00					
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	3.29	4.71	4.30	2.83	1.98	1.27	0.95
Benzene	2.03	2.92	2.66	1.74	1.21	0.78	0.59
2,2,4-Trimethylpentane (isooctane)	1.70	2.42	2.21	1.47	1.05	0.71	0.56
Toluene	2.84	4.00	3.66	2.46	1.81	1.28	1.07
Ethylbenzene	0.24	0.32	0.30	0.22	0.18	0.14	0.13
Xylenes (mixed isomers)	1.17	1.52	1.41	1.06	0.88	0.73	0.69
Isopropyl benzene (Cumene)	0.03	0.03	0.03	0.03	0.02	0.02	0.02
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.31	0.35	0.34	0.30	0.28	0.26	0.26
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)	0.28	0.42	0.38	0.24	0.16	0.10	0.07
Naphthalene	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Styrene	0.02	0.02	0.02	0.02	0.01	0.01	0.01
Cresol (-m)							
Biphenyl							
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Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 920 Post-Project
Tank Name		TK_{name}		Pocatello Tank 920 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank Roof Type		TK_{roof}		IFR - Column Supported Roof
Normal Capacity		Cap	gal	745,206
Diameter		D	ft	60.0
Shell Height or Length		H_S	ft	0.0
External Shell Color		SC_{ext}		Aluminum/Specular
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Aluminum/Specular
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.39
Tank Roof Paint Solar Absorbance		α_{Roof}		0.39
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.39
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Floating Roof Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Rim-Seal System		$TK_{RimSeal}$		Mechanical-shoe/Rim-mounted
Tank Fittings		$TK_{Fittings}$		Detail
Number of fixed roof support columns		N_{Col}		1
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	0.7
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		--
Deck Type		TK_{Deck}		Welded
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	$= \pi * D^2 / 4$ {Eqn. 2-9}	A_{deck}	ft^2	2,827.4
Deck Seam Length Factor	$= L_{Seam} / A_{deck}$ {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	0.6
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.4
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.0
Seal related wind speed exponent		n		1.0

Emission Summary

Annual Throughput, gal	**43,518,468**	**Annual Turnovers**	**58.40**
Annual Emissions, tons	**2.65**		
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**	
Jan	219.96	0.110	
Feb	228.93	0.114	
Mar	303.34	0.152	
Apr	366.65	0.183	
May	480.25	0.240	
Jun	611.54	0.306	
Jul	834.33	0.417	
Aug	774.97	0.387	
Sep	544.70	0.272	
Oct	411.69	0.206	
Nov	288.40	0.144	
Dec	227.85	0.1139	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations					1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	3,696,089	3,338,403	3,696,089	3,576,860	3,696,089
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= $[(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}	381.0	381.0	381.0	381.0	381.0
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		541	820	1,215	1,613	1,953
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = $0.14 * t_{IS} / t_{yr}$ {bolted deck}	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla-i}/P_{VA,Tla}))$ $M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		M_L	lb/lb-mole		92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} $= \Sigma (M_{L-i} * Z_{Li})$ {full speciation, Eqn. 1-22}	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		T_{AN}	°F		14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F		32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= $(T_{AX} + T_{AN}) / 2$ {Eqn. 1-27}	23.30	29.10	36.30	44.90	53.55
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= $(0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}	25.72	32.38	40.79	50.62	60.32
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= $T_{AA} + (6 * \alpha_{Tot} - 1)$ {Eqn. 1-28}	24.64	30.44	37.64	46.24	54.89
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$	4.1664	4.7815	5.6605	6.8453	8.1993
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia		4.0731	4.5955	5.3172	6.2950	7.4175
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_I		$= (P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}	0.0980	0.1138	0.1372	0.1728	0.2205
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		L_R	lb/month	$= (K_{Ra} + K_{Rb} * v^n) * D * P_I * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}	17.98	18.85	25.17	30.67	40.45
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	$= 0.943 * (Q / (42 \text{ gal/bbl})) * C_S * W_L / D * (1 + (N_{Col} * F_C / D))$ {Eqn. 2-4}	11.75	10.62	11.75	11.37	11.75
Deck Fitting Loss		L_F	lb/month	$= F_F * P_I * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}	190.23	199.47	266.41	324.60	428.05
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} $= K_D * S_D * D^2 * P_I * M_V * K_C$ {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**$= L_R + L_{WD} + L_F + L_D$ {Eqn. 2-1}**	**219.96**	**228.93**	**303.34**	**366.65**	**480.25**

	Calculatio	6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		3,576,860	3,696,089	3,696,089	3,576,860	3,696,089	3,576,860	3,696,089
Days-In-Service	Input "0" for OOS	30	31	31	30	31	30	31
Shell Clingage Factor		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	381.0	381.0	381.0	381.0	381.0	381.0	381.0
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Product Factor	Eqn. 2-3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		92.0	92.0	92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		5.60	5.60	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	70.22	78.41	75.54	64.59	52.12	38.27	26.95
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	63.99	71.89	69.94	60.29	49.34	36.94	26.09
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	9.7913	11.2846	10.7420	8.8592	7.0427	5.3844	4.2753
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	8.7638	10.0823	9.7433	8.1950	6.6806	5.2433	4.1989
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.2919	0.3871	0.3592	0.2594	0.1882	0.1347	0.1017
Average Ambient Wind Speed	Monthly Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		51.82	71.02	65.89	46.05	34.53	23.92	18.66
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	11.37	11.75	11.75	11.37	11.75	11.37	11.75
Deck Fitting Loss		548.35	751.55	697.32	487.28	365.41	253.11	197.44
Deck Seam Loss		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**611.54**	**834.33**	**774.97**	**544.70**	**411.69**	**288.40**	**227.85**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi}	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$				
Component Name		(lb/lb-mol)	lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	86.17	26.61	0.90	0.97	1.36	1.74	2.42
Benzene	2	78.11	16.41	0.56	0.60	0.83	1.07	1.49
2,2,4-Trimethylpentane (isooctane)	3	114.23	14.08	0.54	0.56	0.75	0.93	1.27
Toluene	4	92.13	24.16	1.03	1.04	1.35	1.62	2.15
Ethylbenzene	5	106.17	2.27	0.13	0.12	0.15	0.16	0.20
Xylenes (mixed isomers)	6	106.17	11.17	0.67	0.63	0.75	0.81	0.97
Isopropyl benzene (Cumene)	7	120.2	0.28	0.02	0.02	0.02	0.02	0.02
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00					
1,2,4-Trimethylbenzene	9	120.19	3.37	0.26	0.23	0.26	0.26	0.29
Cyclohexane	10	84.16	0.00					
Gasoline (RVP 13)	11	62	0.00					
Ethyl alcohol	12	46.07	0.00					
Acetaldehyde	13	44	0.00					
Methyl alcohol (Methanol)	14	32.04	2.21	0.07	0.07	0.10	0.14	0.20
Naphthalene	15	128.2	0.43	0.04	0.03	0.04	0.03	0.04
Styrene	16	104.15	0.16	0.01	0.01	0.01	0.01	0.01
Cresol (-m)	17	108.1	0.00					
Biphenyl	18	154.21	0.00					
Phenol	19	94.11	0.00					
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	3.27	4.69	4.28	2.81	1.97	1.27	0.94
Benzene	2.02	2.90	2.64	1.73	1.20	0.78	0.58
2,2,4-Trimethylpentane (isooctane)	1.69	2.41	2.20	1.46	1.04	0.70	0.55
Toluene	2.82	3.97	3.63	2.44	1.79	1.27	1.06
Ethylbenzene	0.24	0.32	0.29	0.21	0.18	0.14	0.13
Xylenes (mixed isomers)	1.15	1.50	1.40	1.04	0.87	0.71	0.67
Isopropyl benzene (Cumene)	0.03	0.03	0.03	0.02	0.02	0.02	0.02
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.30	0.35	0.33	0.29	0.28	0.25	0.26
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)	0.28	0.42	0.38	0.24	0.16	0.10	0.07
Naphthalene	0.04	0.04	0.04	0.04	0.04	0.03	0.04
Styrene	0.02	0.02	0.02	0.01	0.01	0.01	0.01
Cresol (-m)							
Biphenyl							
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Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 921 Post-Project
Tank Name		TK_{name}		Pocatello Tank 921 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank Roof Type		TK_{roof}		IFR - Column Supported Roof
Normal Capacity		Cap	gal	1,950,060
Diameter		D	ft	90.0
Shell Height or Length		H_S	ft	0.0
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= (α_{Shell} + α_{Roof}) / 2 {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Floating Roof Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Rim-Seal System		$TK_{RimSeal}$		Mechanical-shoe/Rim-mounted
Tank Fittings		$TK_{Fittings}$		Detail
Number of fixed roof support columns		N_{Col}		6
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	0.7
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		--
Deck Type		TK_{Deck}		Welded
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	= π * D^2 / 4 {Eqn. 2-9}	A_{deck}	ft^2	6,361.7
Deck Seam Length Factor	= L_{Seam} / A_{deck} {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	0.6
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.4
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.0
Seal related wind speed exponent		n		1.0

Emission Summary			
Annual Throughput, gal	**113,879,415**	**Annual Turnovers**	**58.40**
Annual Emissions, tons	**4.50**		
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**	
Jan	377.07	0.189	
Feb	392.20	0.196	
Mar	519.14	0.260	
Apr	626.44	0.313	
May	818.36	0.409	
Jun	1,037.02	0.519	
Jul	1,402.92	0.701	
Aug	1,306.70	0.653	
Sep	925.85	0.463	
Oct	702.81	0.351	
Nov	493.64	0.247	
Dec	390.54	0.1953	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations					1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	9,671,950	8,735,955	9,671,950	9,359,952	9,671,950
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= $[(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}	683.2	683.2	683.2	683.2	683.2
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		541	820	1,215	1,613	1,953
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = $0.14 * t_{IS} / t_{yr}$ {bolted deck}	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla-i}/P_{VA,Tla}))$ $M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		M_L	lb/lb-mole		92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} $= \Sigma (M_{L-i} * Z_{Li})$ {full speciation, Eqn. 1-22}	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		T_{AN}	°F		14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F		32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= $(T_{AX} + T_{AN}) / 2$ {Eqn. 1-27}	23.30	29.10	36.30	44.90	53.55
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= $(0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}	24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= $T_{AA} + (6 * \alpha_{Tot} - 1)$ {Eqn. 1-28}	23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$	4.0217	4.5740	5.3494	6.3974	7.5984
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia		3.9611	4.4721	5.1785	6.1363	7.2367
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_I		$= (P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}	0.0947	0.1099	0.1325	0.1667	0.2122
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		L_R	lb/month	$= (K_{Ra} + K_{Rb} * v^n) * D * P_I * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}	26.07	27.33	36.47	44.38	58.39
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	$= 0.943 * (Q / (42 gal/bbl)) * C_S * W_L / D * (1 + (N_{Col} * F_C / D))$ {Eqn. 2-4}	21.21	19.16	21.21	20.53	21.21
Deck Fitting Loss		L_F	lb/month	$= F_F * P_I * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}	329.79	345.71	461.45	561.52	738.75
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} $= K_D * S_D * D^2 * P_I * M_V * K_C$ {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**$= L_R + L_{WD} + L_F + L_D$ {Eqn. 2-1}**	**377.07**	**392.20**	**519.14**	**626.44**	**818.36**

	Calculatio	6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		9,359,952	9,671,950	9,671,950	9,359,952	9,671,950	9,359,952	9,671,950
Days-In-Service	Input "0" for OOS	30	31	31	30	31	30	31
Shell Clingage Factor		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	683.2	683.2	683.2	683.2	683.2	683.2	683.2
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Product Factor	Eqn. 2-3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		92.0	92.0	92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		5.60	5.60	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	9.0262	10.3985	9.9805	8.3159	6.6987	5.1918	4.1382
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	8.5574	9.8518	9.5189	7.9993	6.5142	5.1062	4.0842
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.2796	0.3678	0.3422	0.2490	0.1814	0.1301	0.0983
Average Ambient Wind Speed	Monthly Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		74.46	101.21	94.17	66.32	49.93	34.66	27.05
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	20.53	21.21	21.21	20.53	21.21	20.53	21.21
Deck Fitting Loss		942.03	1,280.50	1,191.32	839.00	631.67	438.46	342.27
Deck Seam Loss		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**1,037.02**	**1,402.92**	**1,306.70**	**925.85**	**702.81**	**493.64**	**390.54**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi} (lb/lb-mol)	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$				
Component Name			lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	86.17	44.14	1.54	1.65	2.28	2.90	4.01
Benzene	2	78.11	27.16	0.96	1.02	1.40	1.78	2.46
2,2,4-Trimethylpentane (isooctane)	3	114.23	23.43	0.93	0.96	1.27	1.56	2.10
Toluene	4	92.13	40.41	1.80	1.80	2.31	2.74	3.59
Ethylbenzene	5	106.17	3.89	0.23	0.22	0.26	0.28	0.34
Xylenes (mixed isomers)	6	106.17	19.23	1.19	1.12	1.32	1.41	1.67
Isopropyl benzene (Cumene)	7	120.2	0.49	0.03	0.03	0.04	0.04	0.04
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00					
1,2,4-Trimethylbenzene	9	120.19	5.97	0.46	0.42	0.47	0.47	0.51
Cyclohexane	10	84.16	0.00					
Gasoline (RVP 13)	11	62	0.00					
Ethyl alcohol	12	46.07	0.00					
Acetaldehyde	13	44	0.00					
Methyl alcohol (Methanol)	14	32.04	3.61	0.11	0.12	0.17	0.23	0.32
Naphthalene	15	128.2	0.77	0.06	0.06	0.06	0.06	0.07
Styrene	16	104.15	0.28	0.02	0.02	0.02	0.02	0.02
Cresol (-m)	17	108.1	0.00					
Biphenyl	18	154.21	0.00					
Phenol	19	94.11	0.00					
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	5.38	7.65	7.02	4.67	3.30	2.15	1.60
Benzene	3.31	4.71	4.32	2.86	2.02	1.32	1.00
2,2,4-Trimethylpentane (isooctane)	2.78	3.91	3.59	2.42	1.76	1.20	0.96
Toluene	4.63	6.44	5.94	4.07	3.05	2.19	1.85
Ethylbenzene	0.40	0.52	0.49	0.36	0.30	0.25	0.23
Xylenes (mixed isomers)	1.94	2.48	2.33	1.78	1.52	1.27	1.20
Isopropyl benzene (Cumene)	0.05	0.06	0.05	0.04	0.04	0.03	0.03
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.53	0.60	0.58	0.51	0.49	0.46	0.46
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)	0.45	0.67	0.61	0.39	0.26	0.16	0.12
Naphthalene	0.06	0.07	0.07	0.06	0.07	0.06	0.06
Styrene	0.03	0.03	0.03	0.03	0.02	0.02	0.02
Cresol (-m)							
Biphenyl							
Phenol							
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Floating Roof Tank Emissions

Based on AP-42, November 2006, Section 7.1.3.2.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 922 Post-Project
Tank Name		TK_{name}		Pocatello Tank 922 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank Roof Type		TK_{roof}		IFR - Column Supported Roof
Normal Capacity		Cap	gal	1,944,558
Diameter		D	ft	90.0
Shell Height or Length		H_S	ft	0.0
External Shell Color		SC_{ext}		Aluminum/Specular
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		Aluminum/Specular
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.39
Tank Roof Paint Solar Absorbance		α_{Roof}		0.39
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.39
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Floating Roof Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Rim-Seal System		$TK_{RimSeal}$		Mechanical-shoe/Rim-mounted
Tank Fittings		$TK_{Fittings}$		Default
Number of fixed roof support columns		N_{Col}		6
Effective Column Diameter	1.1 for 9" by 7" built-up column 0.7 for 8" diameter pipe column 1.0 for unknown pipe column	F_C	(col perimeter/π) ft	1.0
Internal Shell Condition		SC_{int}		Light Rust
Tank Construction		TK_{Const}		--
Deck Type		TK_{Deck}		Welded
Total Length of Deck Seams		L_{Seam}	ft	--
Area of deck	$= \pi * D^2 / 4$ {Eqn. 2-9}	A_{deck}	ft^2	6,361.7
Deck Seam Length Factor	$= L_{Seam} / A_{deck}$ {Eqn. 2-9} = 0.20 ft/ft^2 {5' wide sheet} = 0.17 ft/ft^2 {6' wide sheet} = 0.14 ft/ft^2 {7' wide sheet} = 0.33 ft/ft^2 {5' x 7.5' panels} = 0.28 ft/ft^2 {5' 12' panels} = 0.20 ft/ft^2 {most common type}	S_D	ft/ft^2	--
Deck Construction (IFR w/Bolted Decks Only)	Not applicable if L_{Seam} specified.	$TK_{DeckConst}$		--
Zero wind speed rim seal loss factor	AP-42 Table 7.1-8	K_{RA}	lb-mole/ft-yr	0.6
Wind speed dependent rim seal loss factor	AP-42 Table 7.1-8	K_{RB}	lb-mole/$(mph)^n$-ft-yr	0.4
Fitting Wind Speed Correction Factor	= 0.7 {EFR Tanks Only} = 0.0 {IFR and Domed EFR Tanks Only} {Eqn. 2-7}	K_V		0.0
Seal related wind speed exponent		n		1.0

Emission Summary

Annual Throughput, gal	**113,558,110**	**Annual Turnovers**	**58.40**
Annual Emissions, tons	**4.75**		
Month	**Normal Operation Loss, lbs**	**Emissions, tpy**	
Jan	394.76	0.197	
Feb	410.79	0.205	
Mar	544.21	0.272	
Apr	657.68	0.329	
May	861.32	0.431	
Jun	1,096.63	0.548	
Jul	1,495.98	0.748	
Aug	1,389.59	0.695	
Sep	976.82	0.488	
Oct	738.43	0.369	
Nov	517.43	0.259	
Dec	408.90	0.2045	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations					1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil				Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type				= User specified	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		Q	gal/month	= User specified	9,644,661	8,711,307	9,644,661	9,333,543	9,644,661
Days-In-Service	Input "0" for OOS	t_{IS}	days	= User specified	31	28	31	30	31
Shell Clingage Factor		C_S	bbl / 1000 ft^2	{Table 7.1-10}	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	F_F	lb-mole/yr	= $[(N_{F1} * K_{F1}) + (N_{F2} * K_{F2}) + \ldots + (N_{Fnf} * K_{Fnf})]$ {Eqn. 2-6}	693.4	693.4	693.4	693.4	693.4
Daily Total Solar Insolation Factor		I	Btu / ft^2 day		541	820	1,215	1,613	1,953
Product Factor	Eqn. 2-3	K_C		= 0.4 {crude oils} = 1.0 {all other org. liquids}	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	K_D	lb-mole / ft-month	= 0.0 {IFR Tank with welded deck and all EFR Tanks} = $0.14 * t_{IS} / t_{yr}$ {bolted deck}	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} $M_V = \Sigma (M_{Vi} * (P_{VA,Tla-i}/P_{VA,Tla}))$ $M_L = 1 / \Sigma (Z_{Li} / M_{Li})$ {full speciation, Eqn. 1-22}	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		M_L	lb/lb-mole		92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		W_L	lb/gal	= VOL data of tank contents {partial speciation} $= \Sigma (M_{L-i} * Z_{Li})$ {full speciation, Eqn. 1-22}	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		T_{AN}	°F		14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F		32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= $(T_{AX} + T_{AN}) / 2$ {Eqn. 1-27}	23.30	29.10	36.30	44.90	53.55
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= $(0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * \alpha_{Tot} * I)$ {Eqn. 1-26}	25.72	32.38	40.79	50.62	60.32
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	T_B	degrees F	= $T_{AA} + (6 * \alpha_{Tot} - 1)$ {Eqn. 1-28}	24.64	30.44	37.64	46.24	54.89
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T} = (T - T_{Low}) / (T_{High} - T_{Low}) * (P_{VA,T,High} - P_{VA,T,Low}) + P_{VA,T,Low}$	4.1664	4.7815	5.6605	6.8453	8.1993
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	$P_{VA,Tb}$	psia		4.0731	4.5955	5.3172	6.2950	7.4175
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	P_I		$= (P_{VA,Tb} / P_A) / (1 + (1 - P_{VA,Tb} / P_A)^{0.5})^2$ {Eqn. 2-3}	0.0980	0.1138	0.1372	0.1728	0.2205
Average Ambient Wind Speed	Monthly Average	v	mph	= 0 {Domed EFR and all IFR tanks, Eqn. 2-3 Note 3}	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		L_R	lb/month	$= (K_{Ra} + K_{Rb} * v^n) * D * P_I * M_V * K_C * t_{IS} / t_{yr}$ {Eqn. 2-2}	26.96	28.27	37.76	46.01	60.67
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	L_{WD}	lb/month	$= 0.943 * (Q / (42 \text{ gal/bbl})) * C_S * W_L / D * (1 + (N_{Col} * F_C / D))$ {Eqn. 2-4}	21.56	19.47	21.56	20.86	21.56
Deck Fitting Loss		L_F	lb/month	$= F_F * P_I * M_V * K_C * t_{IS} / t_{yr}$ {Eqn 2-5}	346.24	363.05	484.89	590.81	779.09
Deck Seam Loss		L_D	lb/month	= 0 {welded IFR and all EFR tanks} $= K_D * S_D * D^2 * P_I * M_V * K_C$ {Eqn. 2-9}	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**L_T**	**lb/month**	**$= L_R + L_{WD} + L_F + L_D$ {Eqn. 2-1}**	**394.76**	**410.79**	**544.21**	**657.68**	**861.32**

	Calculatio	6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate	Petroleum Distillate
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)	Gasoline (RVP 15.0)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello	Gasoline - Pocatello
Speciation Profile Type		Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation	Partial Speciation
Monthly Throughput		9,333,543	9,644,661	9,644,661	9,333,543	9,644,661	9,333,543	9,644,661
Days-In-Service	Input "0" for OOS	30	31	31	30	31	30	31
Shell Clingage Factor		0.0015	0.0015	0.0015	0.0015	0.0015	0.0015	0.0015
Total Deck Fitting Loss Factor	Eqn. 2-6	693.4	693.4	693.4	693.4	693.4	693.4	693.4
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Product Factor	Eqn. 2-3	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Deck Seam Loss per Unit Seam Length Factor	Converted K_D into monthly emissions by scaling by the time in service for the month.	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M of each component.	60.0	60.0	60.0	60.0	60.0	60.0	60.0
Liquid Molecular Weight		92.0	92.0	92.0	92.0	92.0	92.0	92.0
Liquid Density at 60 °F		5.60	5.60	5.60	5.60	5.60	5.60	5.60
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	70.22	78.41	75.54	64.59	52.12	38.27	26.95
Liquid Bulk Temperature	If T_B is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated.	63.99	71.89	69.94	60.29	49.34	36.94	26.09
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	9.7913	11.2846	10.7420	8.8592	7.0427	5.3844	4.2753
Vapor Pressure at Daily Av. Liquid Bulk Temp.	Used for vapor space expansion factor. $P_{VA,Tb}$ uses T_B.	8.7638	10.0823	9.7433	8.1950	6.6806	5.2433	4.1989
Vapor Pressure Function	Use T_B for calculating P_{VA} per Eqn. 2-3 Note 3.	0.2919	0.3871	0.3592	0.2594	0.1882	0.1347	0.1017
Average Ambient Wind Speed	Monthly Average	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Rim Seal Loss		77.72	106.53	98.84	69.07	51.79	35.88	27.99
Withdrawal Loss	Constant 0.943 has units of (1,000 ft^3 gal / bbl^2)	20.86	21.56	21.56	20.86	21.56	20.86	21.56
Deck Fitting Loss		998.04	1,367.90	1,269.19	886.89	665.07	460.69	359.36
Deck Seam Loss		0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total Emission from Normal Operation		**1,096.63**	**1,495.98**	**1,389.59**	**976.82**	**738.43**	**517.43**	**408.90**

Speciated Component Emissions	Species ID	Vapor MW M_{Vi} (lb/lb-mol)	Annual Emissions	Monthly Emissions (lb/month) $L_{Ti} = Z_{Vi} * (L_R + L_F + L_D) + Z_{Li} * L_{WD}$				
Component Name			lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	86.17	47.78	1.62	1.75	2.44	3.12	4.34
Benzene	2	78.11	29.49	1.02	1.09	1.50	1.92	2.67
2,2,4-Trimethylpentane (isooctane)	3	114.23	25.36	0.97	1.01	1.35	1.68	2.28
Toluene	4	92.13	43.61	1.88	1.89	2.44	2.93	3.88
Ethylbenzene	5	106.17	4.13	0.24	0.23	0.27	0.30	0.36
Xylenes (mixed isomers)	6	106.17	20.31	1.22	1.15	1.37	1.48	1.76
Isopropyl benzene (Cumene)	7	120.2	0.51	0.03	0.03	0.04	0.04	0.04
Methyl-tert-butyl ether (MTBE)	8	88.15	0.00					
1,2,4-Trimethylbenzene	9	120.19	6.16	0.47	0.43	0.48	0.48	0.53
Cyclohexane	10	84.16	0.00					
Gasoline (RVP 13)	11	62	0.00					
Ethyl alcohol	12	46.07	0.00					
Acetaldehyde	13	44	0.00					
Methyl alcohol (Methanol)	14	32.04	3.97	0.12	0.13	0.19	0.25	0.36
Naphthalene	15	128.2	0.78	0.07	0.06	0.07	0.06	0.07
Styrene	16	104.15	0.30	0.02	0.02	0.02	0.02	0.03
Cresol (-m)	17	108.1	0.00					
Biphenyl	18	154.21	0.00					
Phenol	19	94.11	0.00					
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)	5.87	8.41	7.67	5.05	3.53	2.28	1.69
Benzene	3.62	5.21	4.74	3.10	2.16	1.40	1.05
2,2,4-Trimethylpentane (isooctane)	3.04	4.32	3.94	2.62	1.87	1.27	1.00
Toluene	5.08	7.14	6.53	4.40	3.24	2.30	1.92
Ethylbenzene	0.43	0.57	0.53	0.39	0.32	0.26	0.24
Xylenes (mixed isomers)	2.09	2.71	2.53	1.89	1.58	1.30	1.23
Isopropyl benzene (Cumene)	0.05	0.06	0.06	0.05	0.04	0.04	0.03
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene	0.55	0.63	0.61	0.53	0.51	0.47	0.47
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)	0.51	0.75	0.68	0.42	0.28	0.17	0.12
Naphthalene	0.07	0.07	0.07	0.06	0.07	0.06	0.07
Styrene	0.03	0.04	0.04	0.03	0.02	0.02	0.02
Cresol (-m)							
Biphenyl							
Phenol							
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Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank 930 Post-Project
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank 930 Post-Project
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		VFR - Cone
Normal Capacity		Cap	gal	65,990
Diameter		D	ft	21.24
Shell Height or Length		H_S	ft	24
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	21.2
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	24.0
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	19.5
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + ^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	0.2
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	0.0625
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	6,909
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary			
Annual Throughput, gal	0	**Annual Emissions** 0.00	Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.
Annual Turnovers	0.00		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	0.00	0.000	
Feb	0.00	0.000	
Mar	0.00	0.000	
Apr	0.00	0.000	
May	0.00	0.000	
Jun	0.00	0.000	
Jul	0.00	0.000	
Aug	0.00	0.000	
Sep	0.00	0.000	
Oct	0.00	0.000	
Nov	0.00	0.000	
Dec	0.00	0.0000	

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					--	--	--	--	--
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Empty - OOS	Empty - OOS	Empty - OOS	Empty - OOS	Empty - OOS
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		--	--	--	--	--
Speciation Profile Type				= User specified		None	None	None	None	None
Monthly Throughput		Q	gal/month	= User specified		--	--	--	--	--
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			--	--	--	--	--
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		--	--	--	--	--
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		--	--	--	--	--
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			--	--	--	--	--
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		--	--	--	--	--
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		--	--	--	--	--
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		--	--	--	--	--
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		--	--	--	--	--
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		--	--	--	--	--
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		--	--	--	--	--
Liquid Molecular Weight		M_L	lb/lb-mole			--	--	--	--	--
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		--	--	--	--	--
Average Daily Minimum Ambient Temperature		T_{AN}	°F			--	--	--	--	--
Average Daily Maximum Ambient Temperature		T_{AX}	°F			--	--	--	--	--
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		--	--	--	--	--
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		--	--	--	--	--
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		--	--	--	--	--
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		--	--	--	--	--

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	--	--	--	--	--	--	--
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Empty - OOS	Empty - OOS	Empty - OOS	Empty - OOS	Empty - OOS	Empty - OOS	Empty - OOS
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--	--	--	--	--
Speciation Profile Type		None	None	None	None	None	None	None
Monthly Throughput		--	--	--	--	--	--	--
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	--	--	--	--	--	--	--
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	--	--	--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	--	--	--	--	--	--	--
Vapor Space Outage		--	--	--	--	--	--	--
Daily Total Solar Insolation Factor		--	--	--	--	--	--	--
Vent Setting Correction Factor		--	--	--	--	--	--	--
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	--	--	--	--	--	--	--
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	--	--	--	--	--	--	--
Working Loss Product Factor		--	--	--	--	--	--	--
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	--	--	--	--	--	--	--
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	--	--	--	--	--	--	--
Liquid Molecular Weight		--	--	--	--	--	--	--
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	--	--	--	--	--	--	--
Average Daily Minimum Ambient Temperature		--	--	--	--	--	--	--
Average Daily Maximum Ambient Temperature		--	--	--	--	--	--	--
Daily Average Ambient Temperature		--	--	--	--	--	--	--
Daily Minimum Liquid Surf. Temperature, F		--	--	--	--	--	--	--
Daily Maximum Liquid Surf. Temperature, F		--	--	--	--	--	--	--
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	--	--	--	--	--	--	--

Calculations						2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}		--	--	--	--	--
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}		--	--	--	--	--
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$		--	--	--	--	--
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia			--	--	--	--	--
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia			--	--	--	--	--
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}		--	--	--	--	--
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}		--	--	--	--	--
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}		--	--	--	--	--
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}		--	--	--	--	--
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}		--	--	--	--	--
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**		**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	--	--	--	--	--	--	--
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	--	--	--	--	--	--	--
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	--	--	--	--	--	--	--
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	--	--	--	--	--	--	--
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	--	--	--	--	--	--	--
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	--	--	--	--	--	--	--
Vapor Density		--	--	--	--	--	--	--
Vapor Space Volume		--	--	--	--	--	--	--
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	--	--	--	--	--	--	--
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	--	--	--	--	--	--	--
Total Losses	**Uncontrolled emissions.**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

Speciated Component Emissions	Species ID	Controlled with Carbon Adsorption?	Annual Emissions	Controlled Monthly Emissions ($L_{T,CD-i}$ lb/month) = ($P_{VA,Tla-i}$ * M_{V-i} / ($P_{VA,Tla}$ * M_V) * (1 - CD_{eff})) * L_T				
Component Name			lb/yr	Jan	Feb	Mar	Apr	May
Hexane (-n)	1	--	0.00					
Benzene	2	--	0.00					
2,2,4-Trimethylpentane (isooctane)	3	--	0.00					
Toluene	4	--	0.00					
Ethylbenzene	5	--	0.00					
Xylenes (mixed isomers)	6	--	0.00					
Isopropyl benzene (Cumene)	7	--	0.00					
Methyl-tert-butyl ether (MTBE)	8	--	0.00					
1,2,4-Trimethylbenzene	9	--	0.00					
Cyclohexane	10	--	0.00					
Gasoline (RVP 13)	11	--	0.00					
Ethyl alcohol	12	--	0.00					
Acetaldehyde	13	--	0.00					
Methyl alcohol (Methanol)	14	--	0.00					
Naphthalene	15	--	0.00					
Styrene	16	--	0.00					
Cresol (-m)	17	--	0.00					
Biphenyl	18	--	0.00					
Phenol	19	--	0.00					
--	20	--						
--	21	--						
--	22	--						
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Speciated Component Emissions

Component Name	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hexane (-n)							
Benzene							
2,2,4-Trimethylpentane (isooctane)							
Toluene							
Ethylbenzene							
Xylenes (mixed isomers)							
Isopropyl benzene (Cumene)							
Methyl-tert-butyl ether (MTBE)							
1,2,4-Trimethylbenzene							
Cyclohexane							
Gasoline (RVP 13)							
Ethyl alcohol							
Acetaldehyde							
Methyl alcohol (Methanol)							
Naphthalene							
Styrene							
Cresol (-m)							
Biphenyl							
Phenol							
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Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank A100 PostProject
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank A100 PostProject
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		VFR - Cone
Normal Capacity		Cap	gal	21,000
Diameter		D	ft	15
Shell Height or Length		H_S	ft	16
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	15.0
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	16.0
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	16.0
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= S_R * (D / 2) / 3 {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	0.1
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	0.04
Tank Maximum Liquid Volume	= π/4 * D_E^2 * H_{LX} {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	2,827
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary

Annual Throughput, gal	9,000	**Annual Emissions**	0.02
Annual Turnovers	0.43		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	0.61	0.000	
Feb	0.78	0.000	
Mar	1.37	0.001	
Apr	2.26	0.001	
May	3.59	0.002	
Jun	5.49	0.003	
Jul	8.10	0.004	
Aug	7.28	0.004	
Sep	4.26	0.002	
Oct	2.56	0.001	
Nov	1.03	0.001	
Dec	0.63	0.0003	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		--	--	--	--	--
Speciation Profile Type				= User specified		None	None	None	None	None
Monthly Throughput		Q	gal/month	= User specified		764	690	764	740	764
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		8.0	8.0	8.0	8.0	8.0
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		8.1	8.1	8.1	8.1	8.1
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0277	0.0311	0.0374	0.0465	0.0529
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.990	0.988	0.983	0.976	0.967
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		M_L	lb/lb-mole			106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		0.04	0.03	0.04	0.03	0.04
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		20.19	25.89	32.75	40.62	48.84
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		27.89	34.54	43.13	53.53	63.53
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		15.39	17.30	20.76	25.82	29.39

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--	--	--	--	--
Speciation Profile Type		None	None	None	None	None	None	None
Monthly Throughput		740	764	764	740	764	740	764
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	--	--	--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	8.0	8.0	8.0	8.0	8.0	8.0	8.0
Vapor Space Outage		8.1	8.1	8.1	8.1	8.1	8.1	8.1
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0623	0.0702	0.0675	0.0555	0.0470	0.0302	0.0272
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.955	0.942	0.946	0.961	0.974	0.984	0.990
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	106.2	106.2	106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		106.2	106.2	106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	0.03	0.04	0.04	0.03	0.04	0.03	0.04
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		57.47	64.60	62.55	53.39	42.96	32.25	21.61
Daily Maximum Liquid Surf. Temperature, F		73.79	82.73	80.07	68.80	56.01	40.64	29.18
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	32.64	36.26	35.05	30.81	26.09	16.79	15.13

Calculations					2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	0.0226	0.0292	0.0398	0.0565	0.0789
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia		0.0192	0.0245	0.0324	0.0442	0.0604
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia		0.0266	0.0348	0.0487	0.0717	0.1022
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}	0.007	0.010	0.016	0.028	0.042
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}	0.00046	0.00059	0.00079	0.00110	0.00151
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}	1,431	1,431	1,431	1,431	1,431
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}	0.56	0.73	1.29	2.15	3.44
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}	0.05	0.05	0.08	0.11	0.15
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**	**0.61**	**0.78**	**1.37**	**2.26**	**3.59**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**	**0.61**	**0.78**	**1.37**	**2.26**	**3.59**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.1099	0.1439	0.1331	0.0939	0.0618	0.0376	0.0240
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0827	0.1060	0.0988	0.0714	0.0484	0.0318	0.0204
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.1445	0.1928	0.1772	0.1223	0.0784	0.0443	0.0280
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.062	0.087	0.078	0.051	0.030	0.012	0.008
Vapor Density		0.00207	0.00267	0.00248	0.00178	0.00120	0.00075	0.00049
Vapor Space Volume		1,431	1,431	1,431	1,431	1,431	1,431	1,431
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	5.29	7.83	7.03	4.08	2.44	0.96	0.58
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	0.20	0.27	0.25	0.18	0.12	0.07	0.05
Total Losses	**Uncontrolled emissions.**	**5.49**	**8.10**	**7.28**	**4.26**	**2.56**	**1.03**	**0.63**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**5.49**	**8.10**	**7.28**	**4.26**	**2.56**	**1.03**	**0.63**

Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank A101 PostProject
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank A101 PostProject
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		HFR
Normal Capacity		Cap	gal	6,000
Diameter		D	ft	8
Shell Height or Length		H_S	ft	16
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	12.8
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	6.3
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	6.3
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	--
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	--
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	802
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary			
Annual Throughput, gal	4,000	**Annual Emissions** 0.01	Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.
Annual Turnovers	0.67		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	0.18	0.000	
Feb	0.23	0.000	
Mar	0.40	0.000	
Apr	0.66	0.000	
May	1.05	0.001	
Jun	1.62	0.001	
Jul	2.40	0.001	
Aug	2.15	0.001	
Sep	1.25	0.001	
Oct	0.75	0.000	
Nov	0.30	0.000	
Dec	0.19	0.0001	

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		--	--	--	--	--
Speciation Profile Type				= User specified		None	None	None	None	None
Monthly Throughput		Q	gal/month	= User specified		340	307	340	329	340
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		--	--	--	--	--
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		3.1	3.1	3.1	3.1	3.1
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0277	0.0311	0.0374	0.0465	0.0529
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.996	0.995	0.993	0.991	0.987
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		M_L	lb/lb-mole			106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		0.06	0.05	0.06	0.05	0.06
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		20.19	25.89	32.75	40.62	48.84
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		27.89	34.54	43.13	53.53	63.53
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		15.39	17.30	20.76	25.82	29.39

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--	--	--	--	--
Speciation Profile Type		None	None	None	None	None	None	None
Monthly Throughput		329	340	340	329	340	329	340
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	--	--	--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	--	--	--	--	--	--	--
Vapor Space Outage		3.1	3.1	3.1	3.1	3.1	3.1	3.1
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0623	0.0702	0.0675	0.0555	0.0470	0.0302	0.0272
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.982	0.977	0.978	0.985	0.990	0.994	0.996
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	106.2	106.2	106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		106.2	106.2	106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	0.05	0.06	0.06	0.05	0.06	0.05	0.06
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		57.47	64.60	62.55	53.39	42.96	32.25	21.61
Daily Maximum Liquid Surf. Temperature, F		73.79	82.73	80.07	68.80	56.01	40.64	29.18
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	32.64	36.26	35.05	30.81	26.09	16.79	15.13

Calculations					2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	0.0226	0.0292	0.0398	0.0565	0.0789
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia		0.0192	0.0245	0.0324	0.0442	0.0604
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia		0.0266	0.0348	0.0487	0.0717	0.1022
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}	0.007	0.010	0.016	0.028	0.042
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}	0.00046	0.00059	0.00079	0.00110	0.00151
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}	402	402	402	402	402
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}	0.16	0.21	0.37	0.61	0.99
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}	0.02	0.02	0.04	0.05	0.07
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**	**0.18**	**0.23**	**0.40**	**0.66**	**1.05**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**	**0.18**	**0.23**	**0.40**	**0.66**	**1.05**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.1099	0.1439	0.1331	0.0939	0.0618	0.0376	0.0240
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0827	0.1060	0.0988	0.0714	0.0484	0.0318	0.0204
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.1445	0.1928	0.1772	0.1223	0.0784	0.0443	0.0280
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.062	0.087	0.078	0.051	0.030	0.012	0.008
Vapor Density		0.00207	0.00267	0.00248	0.00178	0.00120	0.00075	0.00049
Vapor Space Volume		402	402	402	402	402	402	402
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	1.53	2.28	2.04	1.18	0.70	0.27	0.17
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	0.09	0.12	0.11	0.08	0.05	0.03	0.02
Total Losses	**Uncontrolled emissions.**	**1.62**	**2.40**	**2.15**	**1.25**	**0.75**	**0.30**	**0.19**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**1.62**	**2.40**	**2.15**	**1.25**	**0.75**	**0.30**	**0.19**

Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank A102 PostProject
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank A102 PostProject
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		HFR
Normal Capacity		Cap	gal	4,000
Diameter		D	ft	6
Shell Height or Length		H_S	ft	19
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	12.0
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	4.7
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	4.7
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	--
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= P_{BP} - P_{BV} {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	--
Tank Maximum Liquid Volume	= π/4 * D_E^2 * H_{LX} {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	535
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary			
Annual Throughput, gal	10,000	**Annual Emissions** 0.00	Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.
Annual Turnovers	2.50		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	0.16	0.000	
Feb	0.20	0.000	
Mar	0.34	0.000	
Apr	0.53	0.000	
May	0.83	0.000	
Jun	1.25	0.001	
Jul	1.83	0.001	
Aug	1.65	0.001	
Sep	0.98	0.000	
Oct	0.60	0.000	
Nov	0.26	0.000	
Dec	0.17	0.0001	

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		--	--	--	--	--
Speciation Profile Type				= User specified		None	None	None	None	None
Monthly Throughput		Q	gal/month	= User specified		849	767	849	822	849
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		--	--	--	--	--
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		2.4	2.4	2.4	2.4	2.4
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0277	0.0311	0.0374	0.0465	0.0529
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.997	0.996	0.995	0.993	0.990
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		M_L	lb/lb-mole			106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		0.21	0.19	0.21	0.21	0.21
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		20.19	25.89	32.75	40.62	48.84
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		27.89	34.54	43.13	53.53	63.53
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		15.39	17.30	20.76	25.82	29.39

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--	--	--	--	--
Speciation Profile Type		None	None	None	None	None	None	None
Monthly Throughput		822	849	849	822	849	822	849
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	--	--	--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	--	--	--	--	--	--	--
Vapor Space Outage		2.4	2.4	2.4	2.4	2.4	2.4	2.4
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0623	0.0702	0.0675	0.0555	0.0470	0.0302	0.0272
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.986	0.982	0.984	0.988	0.992	0.995	0.997
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	106.2	106.2	106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		106.2	106.2	106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		57.47	64.60	62.55	53.39	42.96	32.25	21.61
Daily Maximum Liquid Surf. Temperature, F		73.79	82.73	80.07	68.80	56.01	40.64	29.18
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	32.64	36.26	35.05	30.81	26.09	16.79	15.13

Calculations						2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}		24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}		23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$		0.0226	0.0292	0.0398	0.0565	0.0789
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia			0.0192	0.0245	0.0324	0.0442	0.0604
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia			0.0266	0.0348	0.0487	0.0717	0.1022
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}		0.007	0.010	0.016	0.028	0.042
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}		0.00046	0.00059	0.00079	0.00110	0.00151
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}		269	269	269	269	269
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}		0.11	0.14	0.25	0.41	0.66
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}		0.05	0.06	0.09	0.12	0.17
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**		**0.16**	**0.20**	**0.34**	**0.53**	**0.83**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**		**0.16**	**0.20**	**0.34**	**0.53**	**0.83**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.1099	0.1439	0.1331	0.0939	0.0618	0.0376	0.0240
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0827	0.1060	0.0988	0.0714	0.0484	0.0318	0.0204
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.1445	0.1928	0.1772	0.1223	0.0784	0.0443	0.0280
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.062	0.087	0.078	0.051	0.030	0.012	0.008
Vapor Density		0.00207	0.00267	0.00248	0.00178	0.00120	0.00075	0.00049
Vapor Space Volume		269	269	269	269	269	269	269
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	1.02	1.53	1.37	0.79	0.47	0.18	0.11
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	0.23	0.30	0.28	0.20	0.14	0.08	0.06
Total Losses	**Uncontrolled emissions.**	**1.25**	**1.83**	**1.65**	**0.98**	**0.60**	**0.26**	**0.17**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**1.25**	**1.83**	**1.65**	**0.98**	**0.60**	**0.26**	**0.17**

Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank A105 PostProject
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank A105 PostProject
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		HFR
Normal Capacity		Cap	gal	2,000
Diameter		D	ft	5.3
Shell Height or Length		H_S	ft	12
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	9.0
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	4.2
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	4.2
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + ^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	--
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	--
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	267
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary

Annual Throughput, gal	9,000	**Annual Emissions**	0.00
Annual Turnovers	4.50		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	0.10	0.000	
Feb	0.12	0.000	
Mar	0.20	0.000	
Apr	0.31	0.000	
May	0.48	0.000	
Jun	0.71	0.000	
Jul	1.03	0.001	
Aug	0.93	0.000	
Sep	0.57	0.000	
Oct	0.35	0.000	
Nov	0.16	0.000	
Dec	0.10	0.0001	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		--	--	--	--	--
Speciation Profile Type				= User specified		None	None	None	None	None
Monthly Throughput		Q	gal/month	= User specified		764	690	764	740	764
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		--	--	--	--	--
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		2.1	2.1	2.1	2.1	2.1
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0277	0.0311	0.0374	0.0465	0.0529
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.998	0.997	0.996	0.994	0.991
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		M_L	lb/lb-mole			106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		0.38	0.35	0.38	0.37	0.38
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		20.19	25.89	32.75	40.62	48.84
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		27.89	34.54	43.13	53.53	63.53
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		15.39	17.30	20.76	25.82	29.39

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--	--	--	--	--
Speciation Profile Type		None	None	None	None	None	None	None
Monthly Throughput		740	764	764	740	764	740	764
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	--	--	--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	--	--	--	--	--	--	--
Vapor Space Outage		2.1	2.1	2.1	2.1	2.1	2.1	2.1
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0623	0.0702	0.0675	0.0555	0.0470	0.0302	0.0272
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.988	0.984	0.986	0.990	0.993	0.996	0.997
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	106.2	106.2	106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		106.2	106.2	106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	0.37	0.38	0.38	0.37	0.38	0.37	0.38
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		57.47	64.60	62.55	53.39	42.96	32.25	21.61
Daily Maximum Liquid Surf. Temperature, F		73.79	82.73	80.07	68.80	56.01	40.64	29.18
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	32.64	36.26	35.05	30.81	26.09	16.79	15.13

Calculations					2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	0.0226	0.0292	0.0398	0.0565	0.0789
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia		0.0192	0.0245	0.0324	0.0442	0.0604
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia		0.0266	0.0348	0.0487	0.0717	0.1022
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}	0.007	0.010	0.016	0.028	0.042
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}	0.00046	0.00059	0.00079	0.00110	0.00151
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}	132	132	132	132	132
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}	0.05	0.07	0.12	0.20	0.33
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}	0.05	0.05	0.08	0.11	0.15
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**	**0.10**	**0.12**	**0.20**	**0.31**	**0.48**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**	**0.10**	**0.12**	**0.20**	**0.31**	**0.48**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.1099	0.1439	0.1331	0.0939	0.0618	0.0376	0.0240
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0827	0.1060	0.0988	0.0714	0.0484	0.0318	0.0204
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.1445	0.1928	0.1772	0.1223	0.0784	0.0443	0.0280
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.062	0.087	0.078	0.051	0.030	0.012	0.008
Vapor Density		0.00207	0.00267	0.00248	0.00178	0.00120	0.00075	0.00049
Vapor Space Volume		132	132	132	132	132	132	132
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	0.51	0.76	0.68	0.39	0.23	0.09	0.05
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	0.20	0.27	0.25	0.18	0.12	0.07	0.05
Total Losses	**Uncontrolled emissions.**	**0.71**	**1.03**	**0.93**	**0.57**	**0.35**	**0.16**	**0.10**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**0.71**	**1.03**	**0.93**	**0.57**	**0.35**	**0.16**	**0.10**

Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.
Tool Last Updated: 7/21/15 Click Here to Go Back to Cover Page

Reporting Year	*2015*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank A108 PostProject
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank A108 PostProject
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		HFR
Normal Capacity		Cap	gal	7,500
Diameter		D	ft	8
Shell Height or Length		H_S	ft	24
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	15.6
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	6.3
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	5.2
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	--
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	--
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	1,003
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary			
Annual Throughput, gal	12,000	**Annual Emissions** 0.01	Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.
Annual Turnovers	1.60		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	0.30	0.000	
Feb	0.38	0.000	
Mar	0.66	0.000	
Apr	1.07	0.001	
May	1.68	0.001	
Jun	2.56	0.001	
Jul	3.78	0.002	
Aug	3.40	0.002	
Sep	2.00	0.001	
Oct	1.21	0.001	
Nov	0.51	0.000	
Dec	0.31	0.0002	

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		--	--	--	--	--
Speciation Profile Type				= User specified		None	None	None	None	None
Monthly Throughput		Q	gal/month	= User specified		1,019	921	1,019	986	1,019
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		--	--	--	--	--
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		3.1	3.1	3.1	3.1	3.1
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0277	0.0311	0.0374	0.0465	0.0529
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.996	0.995	0.993	0.991	0.987
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		M_L	lb/lb-mole			106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		0.14	0.12	0.14	0.13	0.14
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		20.19	25.89	32.75	40.62	48.84
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		27.89	34.54	43.13	53.53	63.53
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		15.39	17.30	20.76	25.82	29.39

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--	--	--	--	--
Speciation Profile Type		None	None	None	None	None	None	None
Monthly Throughput		986	1,019	1,019	986	1,019	986	1,019
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	--	--	--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	--	--	--	--	--	--	--
Vapor Space Outage		3.1	3.1	3.1	3.1	3.1	3.1	3.1
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0623	0.0702	0.0675	0.0555	0.0470	0.0302	0.0272
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.982	0.977	0.978	0.985	0.990	0.994	0.996
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	106.2	106.2	106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		106.2	106.2	106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	0.13	0.14	0.14	0.13	0.14	0.13	0.14
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		57.47	64.60	62.55	53.39	42.96	32.25	21.61
Daily Maximum Liquid Surf. Temperature, F		73.79	82.73	80.07	68.80	56.01	40.64	29.18
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	32.64	36.26	35.05	30.81	26.09	16.79	15.13

Calculations					2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**	**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service					**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}	24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}	23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$	0.0226	0.0292	0.0398	0.0565	0.0789
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia		0.0192	0.0245	0.0324	0.0442	0.0604
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia		0.0266	0.0348	0.0487	0.0717	0.1022
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}	0.007	0.010	0.016	0.028	0.042
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}	0.00046	0.00059	0.00079	0.00110	0.00151
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}	603	603	603	603	603
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}	0.24	0.31	0.55	0.92	1.48
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}	0.06	0.07	0.11	0.15	0.21
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**	**0.30**	**0.38**	**0.66**	**1.07**	**1.68**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**	**0.30**	**0.38**	**0.66**	**1.07**	**1.68**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.1099	0.1439	0.1331	0.0939	0.0618	0.0376	0.0240
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0827	0.1060	0.0988	0.0714	0.0484	0.0318	0.0204
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.1445	0.1928	0.1772	0.1223	0.0784	0.0443	0.0280
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.062	0.087	0.078	0.051	0.030	0.012	0.008
Vapor Density		0.00207	0.00267	0.00248	0.00178	0.00120	0.00075	0.00049
Vapor Space Volume		603	603	603	603	603	603	603
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	2.29	3.42	3.06	1.76	1.04	0.41	0.25
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	0.27	0.36	0.34	0.24	0.16	0.10	0.07
Total Losses	**Uncontrolled emissions.**	**2.56**	**3.78**	**3.40**	**2.00**	**1.21**	**0.51**	**0.31**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**2.56**	**3.78**	**3.40**	**2.00**	**1.21**	**0.51**	**0.31**

Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.
Tool Last Updated: 7/21/15 Click Here to Go Back to Cover Page

Reporting Year	*2015*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank A110 PostProject
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank A110 PostProject
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		HFR
Normal Capacity		Cap	gal	4,000
Diameter		D	ft	7.5
Shell Height or Length		H_S	ft	12
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	10.7
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	5.9
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	5.9
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	--
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	--
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	535
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary			
Annual Throughput, gal	6,000	**Annual Emissions**	0.00
Annual Turnovers	1.50		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	0.14	0.000	
Feb	0.17	0.000	
Mar	0.30	0.000	
Apr	0.48	0.000	
May	0.75	0.000	
Jun	1.14	0.001	
Jul	1.69	0.001	
Aug	1.52	0.001	
Sep	0.89	0.000	
Oct	0.54	0.000	
Nov	0.23	0.000	
Dec	0.14	0.0001	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		--	--	--	--	--
Speciation Profile Type				= User specified		None	None	None	None	None
Monthly Throughput		Q	gal/month	= User specified		510	460	510	493	510
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		--	--	--	--	--
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		2.9	2.9	2.9	2.9	2.9
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0277	0.0311	0.0374	0.0465	0.0529
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.996	0.995	0.994	0.991	0.988
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		M_L	lb/lb-mole			106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		0.13	0.12	0.13	0.12	0.13
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		20.19	25.89	32.75	40.62	48.84
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		27.89	34.54	43.13	53.53	63.53
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		15.39	17.30	20.76	25.82	29.39

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--	--	--	--	--
Speciation Profile Type		None	None	None	None	None	None	None
Monthly Throughput		493	510	510	493	510	493	510
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	--	--	--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	--	--	--	--	--	--	--
Vapor Space Outage		2.9	2.9	2.9	2.9	2.9	2.9	2.9
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0623	0.0702	0.0675	0.0555	0.0470	0.0302	0.0272
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.983	0.978	0.980	0.986	0.990	0.994	0.996
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	106.2	106.2	106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		106.2	106.2	106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	0.12	0.13	0.13	0.12	0.13	0.12	0.13
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		57.47	64.60	62.55	53.39	42.96	32.25	21.61
Daily Maximum Liquid Surf. Temperature, F		73.79	82.73	80.07	68.80	56.01	40.64	29.18
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	32.64	36.26	35.05	30.81	26.09	16.79	15.13

Calculations						2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}		24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}		23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$		0.0226	0.0292	0.0398	0.0565	0.0789
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia			0.0192	0.0245	0.0324	0.0442	0.0604
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia			0.0266	0.0348	0.0487	0.0717	0.1022
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}		0.007	0.010	0.016	0.028	0.042
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}		0.00046	0.00059	0.00079	0.00110	0.00151
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}		265	265	265	265	265
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}		0.11	0.14	0.24	0.40	0.65
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}		0.03	0.04	0.05	0.07	0.10
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**		**0.14**	**0.17**	**0.30**	**0.48**	**0.75**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**		**0.14**	**0.17**	**0.30**	**0.48**	**0.75**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.1099	0.1439	0.1331	0.0939	0.0618	0.0376	0.0240
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0827	0.1060	0.0988	0.0714	0.0484	0.0318	0.0204
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.1445	0.1928	0.1772	0.1223	0.0784	0.0443	0.0280
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.062	0.087	0.078	0.051	0.030	0.012	0.008
Vapor Density		0.00207	0.00267	0.00248	0.00178	0.00120	0.00075	0.00049
Vapor Space Volume		265	265	265	265	265	265	265
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	1.01	1.50	1.35	0.78	0.46	0.18	0.11
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	0.14	0.18	0.17	0.12	0.08	0.05	0.03
Total Losses	**Uncontrolled emissions.**	**1.14**	**1.69**	**1.52**	**0.89**	**0.54**	**0.23**	**0.14**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**1.14**	**1.69**	**1.52**	**0.89**	**0.54**	**0.23**	**0.14**

Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank A112 PostProject
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank A112 PostProject
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		HFR
Normal Capacity		Cap	gal	6,500
Diameter		D	ft	7.5
Shell Height or Length		H_S	ft	18
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	13.1
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	5.9
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	6.4
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	--
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	--
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	869
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary

Annual Throughput, gal	11,000	**Annual Emissions**	0.01
Annual Turnovers	1.69		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	0.22	0.000	
Feb	0.27	0.000	
Mar	0.46	0.000	
Apr	0.74	0.000	
May	1.16	0.001	
Jun	1.76	0.001	
Jul	2.59	0.001	
Aug	2.33	0.001	
Sep	1.38	0.001	
Oct	0.84	0.000	
Nov	0.36	0.000	
Dec	0.22	0.0001	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		--	--	--	--	--
Speciation Profile Type				= User specified		None	None	None	None	None
Monthly Throughput		Q	gal/month	= User specified		934	844	934	904	934
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		--	--	--	--	--
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		2.9	2.9	2.9	2.9	2.9
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0277	0.0311	0.0374	0.0465	0.0529
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.996	0.995	0.994	0.991	0.988
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		M_L	lb/lb-mole			106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		0.14	0.13	0.14	0.14	0.14
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		20.19	25.89	32.75	40.62	48.84
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		27.89	34.54	43.13	53.53	63.53
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		15.39	17.30	20.76	25.82	29.39

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--	--	--	--	--
Speciation Profile Type		None	None	None	None	None	None	None
Monthly Throughput		904	934	934	904	934	904	934
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	--	--	--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	--	--	--	--	--	--	--
Vapor Space Outage		2.9	2.9	2.9	2.9	2.9	2.9	2.9
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0623	0.0702	0.0675	0.0555	0.0470	0.0302	0.0272
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.983	0.978	0.980	0.986	0.990	0.994	0.996
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	106.2	106.2	106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		106.2	106.2	106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	0.14	0.14	0.14	0.14	0.14	0.14	0.14
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		57.47	64.60	62.55	53.39	42.96	32.25	21.61
Daily Maximum Liquid Surf. Temperature, F		73.79	82.73	80.07	68.80	56.01	40.64	29.18
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	32.64	36.26	35.05	30.81	26.09	16.79	15.13

Calculations						2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}		24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}		23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$		0.0226	0.0292	0.0398	0.0565	0.0789
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia			0.0192	0.0245	0.0324	0.0442	0.0604
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia			0.0266	0.0348	0.0487	0.0717	0.1022
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}		0.007	0.010	0.016	0.028	0.042
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}		0.00046	0.00059	0.00079	0.00110	0.00151
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}		398	398	398	398	398
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}		0.16	0.20	0.36	0.61	0.98
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}		0.06	0.07	0.10	0.13	0.19
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**		**0.22**	**0.27**	**0.46**	**0.74**	**1.16**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**		**0.22**	**0.27**	**0.46**	**0.74**	**1.16**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.1099	0.1439	0.1331	0.0939	0.0618	0.0376	0.0240
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0827	0.1060	0.0988	0.0714	0.0484	0.0318	0.0204
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.1445	0.1928	0.1772	0.1223	0.0784	0.0443	0.0280
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.062	0.087	0.078	0.051	0.030	0.012	0.008
Vapor Density		0.00207	0.00267	0.00248	0.00178	0.00120	0.00075	0.00049
Vapor Space Volume		398	398	398	398	398	398	398
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	1.51	2.26	2.02	1.16	0.69	0.27	0.16
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	0.25	0.33	0.31	0.22	0.15	0.09	0.06
Total Losses	**Uncontrolled emissions.**	**1.76**	**2.59**	**2.33**	**1.38**	**0.84**	**0.36**	**0.22**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**1.76**	**2.59**	**2.33**	**1.38**	**0.84**	**0.36**	**0.22**

Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank A113 PostProject
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank A113 PostProject
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		HFR
Normal Capacity		Cap	gal	7,800
Diameter		D	ft	7.5
Shell Height or Length		H_S	ft	22
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	14.5
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	5.9
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters				
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Value**
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	6.3
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	--
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	--
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	1,043
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary			
Annual Throughput, gal	11,000	**Annual Emissions** 0.01	Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.
Annual Turnovers	1.41		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	0.25	0.000	
Feb	0.32	0.000	
Mar	0.54	0.000	
Apr	0.88	0.000	
May	1.38	0.001	
Jun	2.10	0.001	
Jul	3.09	0.002	
Aug	2.78	0.001	
Sep	1.64	0.001	
Oct	0.99	0.000	
Nov	0.42	0.000	
Dec	0.26	0.0001	

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		--	--	--	--	--
Speciation Profile Type				= User specified		None	None	None	None	None
Monthly Throughput		Q	gal/month	= User specified		934	844	934	904	934
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		--	--	--	--	--
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		2.9	2.9	2.9	2.9	2.9
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0277	0.0311	0.0374	0.0465	0.0529
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.996	0.995	0.994	0.991	0.988
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		M_L	lb/lb-mole			106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		0.12	0.11	0.12	0.12	0.12
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		20.19	25.89	32.75	40.62	48.84
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		27.89	34.54	43.13	53.53	63.53
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		15.39	17.30	20.76	25.82	29.39

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--	--	--	--	--
Speciation Profile Type		None	None	None	None	None	None	None
Monthly Throughput		904	934	934	904	934	904	934
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	--	--	--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	--	--	--	--	--	--	--
Vapor Space Outage		2.9	2.9	2.9	2.9	2.9	2.9	2.9
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0623	0.0702	0.0675	0.0555	0.0470	0.0302	0.0272
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.983	0.978	0.980	0.986	0.990	0.994	0.996
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	106.2	106.2	106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		106.2	106.2	106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	0.12	0.12	0.12	0.12	0.12	0.12	0.12
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		57.47	64.60	62.55	53.39	42.96	32.25	21.61
Daily Maximum Liquid Surf. Temperature, F		73.79	82.73	80.07	68.80	56.01	40.64	29.18
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	32.64	36.26	35.05	30.81	26.09	16.79	15.13

Calculations						2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}		24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}		23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$		0.0226	0.0292	0.0398	0.0565	0.0789
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia			0.0192	0.0245	0.0324	0.0442	0.0604
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia			0.0266	0.0348	0.0487	0.0717	0.1022
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}		0.007	0.010	0.016	0.028	0.042
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}		0.00046	0.00059	0.00079	0.00110	0.00151
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}		486	486	486	486	486
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}		0.19	0.25	0.44	0.74	1.19
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}		0.06	0.07	0.10	0.13	0.19
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**		**0.25**	**0.32**	**0.54**	**0.88**	**1.38**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**		**0.25**	**0.32**	**0.54**	**0.88**	**1.38**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.1099	0.1439	0.1331	0.0939	0.0618	0.0376	0.0240
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0827	0.1060	0.0988	0.0714	0.0484	0.0318	0.0204
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.1445	0.1928	0.1772	0.1223	0.0784	0.0443	0.0280
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.062	0.087	0.078	0.051	0.030	0.012	0.008
Vapor Density		0.00207	0.00267	0.00248	0.00178	0.00120	0.00075	0.00049
Vapor Space Volume		486	486	486	486	486	486	486
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	1.85	2.76	2.47	1.42	0.84	0.33	0.20
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	0.25	0.33	0.31	0.22	0.15	0.09	0.06
Total Losses	**Uncontrolled emissions.**	**2.10**	**3.09**	**2.78**	**1.64**	**0.99**	**0.42**	**0.26**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**2.10**	**3.09**	**2.78**	**1.64**	**0.99**	**0.42**	**0.26**

Fixed-Roof Tank Emissions - Monthly

Based on AP-42, November 2006, Section 7.1.3.1.

Tool Last Updated: 7/21/15 *Click Here to Go Back to Cover Page*

Reporting Year	*2015*

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Tank ID	Enter only Tank ID in this tab.			Pocatello Tank A114 PostProject
Tank Name	Text Description of Tank Name	TK_{name}		Pocatello Tank A114 PostProject
Actual Location		Loc_{Act}		Pocatello, Idaho
Location for Calculation Purposes		Loc_{Calc}		Pocatello, Idaho
Tank/Roof Type		TK_{roof}		HFR
Normal Capacity		Cap	gal	1,600
Diameter		D	ft	8
Shell Height or Length		H_S	ft	6
Effective Diameter	= $((H_S * D) / (\pi/4))^{0.5}$ {horiz. tanks only, Eqn. 1-13} = D {all other fixed roof tanks}	D_E	ft	7.8
Effective Height	= π/4 * D {horiz. tanks only, Eqn. 1-14} = H_S {all other fixed roof tanks}	H_E	ft	6.3
External Shell Color		SC_{ext}		White
External Shell Paint Condition		PC_{Shell}		Good
Roof Color/Shade		RC		White
Roof Paint Condition		PC_{Roof}		Good
Tank Shell Solar Absorbance		α_{Shell}		0.17
Tank Roof Paint Solar Absorbance		α_{Roof}		0.17
Total Tank Paint Solar Absorbance	= $(\alpha_{Shell} + \alpha_{Roof}) / 2$ {Note A, Table 7.1-6}	α_{Tot}		0.17
Ideal Gas Constant,		R	psia ft^3 / lbmole °R	10.731
Ambient Pressure		P_A	psia	12.528

Tank Reference Parameters

Parameter Title	Notes	Parameter Symbol	Units	Value
Underground Tank?		UT		Aboveground
Heated Tank?		HT		No
Liquid Bulk Temperature	Heated Tanks Only	T_B	Degrees F	--
Insulated Tank?		IT		No
Pressure Tank?		PT		Atmospheric
Normal Operating Pressure	Only for Pressure Tanks	P_I	psig	0.0
Vapor Tight Roof		VTR		No
Control Device		CD		None
Control Device Efficiency		CD_{Eff}	%	--
Maximum Liquid Height		H_{LX}	ft	4.5
Dome Tank Roof Height	= $R_R - (R_R^2 - (D / 2)^2)^{0.5}$ {dome roof with D = 2 * R_S, Eqn. 1-19}	H_R	ft	--
Roof Outage	= $S_R * (D / 2) / 3$ {cone roof, Eqn. 1-16 and 1-17} = $H_R * (^1/_2 + {}^1/_6 * (H_R / (D / 2))^2)$ {dome roof, Eqn. 1-18}	H_{RO}	ft	--
Breather Vent Pressure Setting	Default Setting is +0.03 psig	P_{BP}	psig	0.03
Breather Vent Vacuum Setting	Default Setting is -0.03 psig	P_{BV}	psig	-0.03
Breather Vent Pressure Setting Range	*= 0 {no vapor tight roof}* *= $P_{BP} - P_{BV}$ {Eqn. 1-11}*	ΔP_B	psig	0.06
Dome Roof Radius	Dome Roofs Only = user input between 0.8 to 1.2 * D {AP-42 7.1-15} = 1.0 * D {default if blank}	R_R	ft	--
Cone Roof Slope	Cone Roofs Only Default = 0.0625 ft/ft	S_R	ft/ft	--
Tank Maximum Liquid Volume	= $\pi/4 * D_E^2 * H_{LX}$ {Eqn. 1-31} Though not stated in AP-42, use DE in place of D for hor. tanks.	V_{LX}	ft^3	214
Days per Year	For leap years, days = 366	t_{yr}	days/yr	365

Emission Summary

Annual Throughput, gal	4,000	**Annual Emissions**	0.00
Annual Turnovers	2.50		
Month	**Emissions, lbs**	**Emissions, tons**	
Jan	0.08	0.000	
Feb	0.10	0.000	
Mar	0.17	0.000	
Apr	0.28	0.000	
May	0.44	0.000	
Jun	0.66	0.000	
Jul	0.98	0.000	
Aug	0.88	0.000	
Sep	0.52	0.000	
Oct	0.32	0.000	
Nov	0.13	0.000	
Dec	0.08	0.0000	

Note: The emission summary table is pulled into the Tank Emissions tab using cell references A31:B42. The emission summary must remain at this cell reference to function properly.

Calculations						1	2	3	4	5
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil					Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):			= User specified		Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):			= User specified		--	--	--	--	--
Speciation Profile Type				= User specified		None	None	None	None	None
Monthly Throughput		Q	gal/month	= User specified		340	307	340	329	340
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	t_{IS}	days			31	28	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	B	°R	= Not Applicable {Organic liquids and full speciation profiles}		--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	H_L	ft	= User specified if known = H_{LX} / 2 {default}		--	--	--	--	--
Vapor Space Outage		H_{VO}	ft	= (H_E / 2) {horizontal tanks only, Eqn. 1-14} = H_S - H_L + H_{RO} {all other fixed roof tanks, Eqn. 1-15}		3.1	3.1	3.1	3.1	3.1
Daily Total Solar Insolation Factor		I	Btu / ft^2 day			541	820	1,215	1,613	1,953
Vent Setting Correction Factor		K_B		= 1 {(P_{BP} ≤ 0.03 or P_{BV} ≥ -0.03 psig) and (K_N * (P_{BP} + P_A) / (P_I + P_A)) ≤ 1.0, Eqn. 1-36} = (((P_I + P_A) / K_N) - $P_{VA,Tla}$) / (P_{BP} + P_A - $P_{VA,Tla}$) {Eqn. 1-37}		1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, K_E ≥ 0.	K_E		= (ΔT_V / (T_{LA} + 459.67 °R)) + ((ΔP_V - ΔP_B) / (P_A - $P_{VA,Tla}$)) ≥ 0 {$P_{VA,Tla}$ ≥ 0.1 psia or P_{BP} > 0.03 psig or P_{BV} < -0.03 psig, Eqn. 1-7} = (0.0018 $°R^{-1}$) * ΔT_V {$P_{VA,Tla}$ < 0.1 psia, Eqn. 1-5}		0.0277	0.0311	0.0374	0.0465	0.0529
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	K_N		= (180 + (N * t_{yr} / t_{IS})) / (6 * (N * t_{yr} / t_{IS})) {(N * t_{yr} / t_{IS}) > 36, Eqn. 1-29} = 1 {(N * t_{yr} / t_{IS}) ≤ 36, Eqn. 1-29}		1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		K_P		= 0.75 {crude oils, Eqn. 1-29} = 1 {all other organic liquids}		1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	K_S		= 1 / (1 + 0.053 * $P_{VA,Tla}$ * H_{VO}) {Eqn. 1-20}		0.996	0.995	0.993	0.991	0.987
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	M_V	lb/lb-mole	= VOL data of tank contents {partial speciation} M_V = Σ (M_{Vi} * ($P_{VA,Tla-i}$/$P_{VA,Tla}$)) M_L = 1 / Σ (Z_{Li} / M_{Li}) {full speciation, Eqn. 1-22}		106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		M_L	lb/lb-mole			106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	N		= 5.614 * Q * (bbl / 42 gal) / V_{LX} {Eqn. 1-30}		0.21	0.19	0.21	0.21	0.21
Average Daily Minimum Ambient Temperature		T_{AN}	°F			14.40	19.80	25.90	32.30	39.60
Average Daily Maximum Ambient Temperature		T_{AX}	°F			32.20	38.40	46.70	57.50	67.50
Daily Average Ambient Temperature		T_{AA}	°F	= (T_{AX} + T_{AN}) / 2 {Eqn. 1-27}		23.30	29.10	36.30	44.90	53.55
Daily Minimum Liquid Surf. Temperature, F		T_{LN}	°F	= T_{LA} - 0.25 * ΔT_V {Fig. 7.1-17}		20.19	25.89	32.75	40.62	48.84
Daily Maximum Liquid Surf. Temperature, F		T_{LX}	°F	= T_{LA} + 0.25 * ΔT_V {Fig. 7.1-17}		27.89	34.54	43.13	53.53	63.53
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	ΔT_V	°R	= 0.72 * (T_{AX} - T_{AN}) + 0.028 * α_{Tot} * I {Eqn. 1-8}		15.39	17.30	20.76	25.82	29.39

Calculations		6	7	8	9	10	11	12
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Type of Substance	Select Organic Liquid, Petroleum Distillate, or Crude Oil	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid	Organic Liquid
Contents of Tank	Select from list (add new compounds in 'VOLs' tab):	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)	Xylenes (mixed isomers)
Speciation Profile	Select from list (add new in 'Speciation Input' tab):	--	--	--	--	--	--	--
Speciation Profile Type		None	None	None	None	None	None	None
Monthly Throughput		329	340	340	329	340	329	340
Days-In-Service	Total days per month minus the days tank has a service change, is out of service, or for non-routine events.	30	31	31	30	31	30	31
Constant in the vapor pressure equation	Used in ΔP_V only for petroleum liquids. If full speciation profile specified, leave blank.	--	--	--	--	--	--	--
Average Liquid Height	Leave blank if unknown. Not applicable for horizontal Tanks. Fill out for tanks operating on level control.	--	--	--	--	--	--	--
Vapor Space Outage		3.1	3.1	3.1	3.1	3.1	3.1	3.1
Daily Total Solar Insolation Factor		2,213	2,309	2,009	1,588	1,095	623	471
Vent Setting Correction Factor		1.000	1.000	1.000	1.000	1.000	1.000	1.000
Vapor Space Expansion Factor	Per AP-42 7.1-12, use Eqn. 1-6 if PVA,Tb < 0.1 psia. Tank location is always known for this tool. True vapor pressure based on liquid stock. If KE < 0, no standing losses occur. Per API MPMS Ch. 19.1.2.1.4.2, $K_E \geq 0$.	0.0623	0.0702	0.0675	0.0555	0.0470	0.0302	0.0272
Working Loss Turnover (Saturation) Factor	Per Eqn. 1-29, annual threshold for turnovers is 36. Equation modified to a monthly form by converting the monthly turnovers to a theoretical annual turnover equivalent.	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Working Loss Product Factor		1.00	1.00	1.00	1.00	1.00	1.00	1.00
Vented Vapor Saturation Factor	Constant 0.053 has units of 1/(psia-ft). True vapor pressure based on liquid surface.	0.982	0.977	0.978	0.985	0.990	0.994	0.996
Vapor Molecular Weight	When using full speciation profiles, calculated as the weighted average of the M_V of each component.	106.2	106.2	106.2	106.2	106.2	106.2	106.2
Liquid Molecular Weight		106.2	106.2	106.2	106.2	106.2	106.2	106.2
Number of Turnovers per Month	Constant 5.614 has units of ft^3/bbl.	0.21	0.21	0.21	0.21	0.21	0.21	0.21
Average Daily Minimum Ambient Temperature		47.30	53.00	50.90	42.80	33.50	26.00	15.80
Average Daily Maximum Ambient Temperature		78.00	88.10	86.30	75.10	62.50	45.20	33.70
Daily Average Ambient Temperature		62.65	70.55	68.60	58.95	48.00	35.60	24.75
Daily Minimum Liquid Surf. Temperature, F		57.47	64.60	62.55	53.39	42.96	32.25	21.61
Daily Maximum Liquid Surf. Temperature, F		73.79	82.73	80.07	68.80	56.01	40.64	29.18
Daily Vapor Temperature Range	Constant 0.028 has units of (°R-ft^2-day/Btu)	32.64	36.26	35.05	30.81	26.09	16.79	15.13

Calculations						2	3	4	5	6
Parameter Title	**Notes**	**Parameter Symbol**	**Units**	**Reference or Equation**		**Jan**	**Feb**	**Mar**	**Apr**	**May**
Service						**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	T_{LA}	°F	= T_B {heated and fully insulated tanks only} = (0.44 * T_{AA}) + (0.56 * T_B) + (0.0079 * α_{Tot} * I) {Eqn. 1-26}		24.04	30.21	37.94	47.08	56.18
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	T_B	°F	= specified by user {heated tanks only} = T_{AA} {fully insulated tanks only} = T_{AA} + (6 * α_{Tot} - 1) {Eqn. 1-28}		23.32	29.12	36.32	44.92	53.57
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	$P_{VA,Tla}$	psia	*{full speciation profiles, Eqn. 1-22}:* Sum of partial true vapor pressures components. *{partial/no speciation profiles}:* Vapor pressures at T (°F) based on P_{VA} values in VOLs tab at ΔT (°F) increments by interpolating between the P_{VA} values at the next highest/lowest T. $P_{VA,T}$ = (T - T_{Low}) / (T_{High} - T_{Low}) * ($P_{VA,T,High}$ - $P_{VA,T,Low}$) + $P_{VA,T,Low}$		0.0226	0.0292	0.0398	0.0565	0.0789
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses T_{LN}.	P_{VN}	psia			0.0192	0.0245	0.0324	0.0442	0.0604
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses T_{LX}.	P_{VX}	psia			0.0266	0.0348	0.0487	0.0717	0.1022
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	ΔP_V	psia	= P_{VX} - P_{VN} {Eqn. 1-9} = (0.50 * B * $P_{VA,Tla}$ * ΔT_V) / (T_{LA} + 459.67 °R)^2 {petroleum liquids if B is known, Eqn. 1-10}		0.007	0.010	0.016	0.028	0.042
Vapor Density		W_V	lb/ft^3	= (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) {Eqn. 1-21}		0.00046	0.00059	0.00079	0.00110	0.00151
Vapor Space Volume		V_V	ft^3	= (π/4 * D_E^2) * H_{VO} {Eqn. 1-3}		151	151	151	151	151
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	L_S	lbs/month	= 0 {underground tanks only} = t_{IS} * V_V * W_V * K_E * K_S {Eqn. 1-2 and 1-4}		0.06	0.08	0.14	0.23	0.37
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	L_W	lbs/month	= Q * (5.614 ft^3/bbl) * (bbl / 42 gal) * (M_V * $P_{VA,Tla}$) / (R * (T_{LA} + 459.67 °R)) * K_N * K_P * K_B {Eqn. 1-29}		0.02	0.02	0.04	0.05	0.07
Total Losses	**Uncontrolled emissions.**	**L_T**	**lbs/month**	**= (L_S + L_W) {Eqn. 1-1}**		**0.08**	**0.10**	**0.17**	**0.28**	**0.44**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**$L_{T,CD}$**	**lbs/month**	**= Not Applicable {no CD} = L_T * (1 - CD_{Eff}) {CD}**		**0.08**	**0.10**	**0.17**	**0.28**	**0.44**

Calculations		7	8	9	10	11	12	13
Parameter Title	**Notes**	**Jun**	**Jul**	**Aug**	**Sep**	**Oct**	**Nov**	**Dec**
Service		**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**	**Main Service**
Daily Average Liquid Surf. Temperature	Constant 0.0079 has units of (°R-ft^2-day/btu).	65.63	73.66	71.31	61.09	49.48	36.45	25.39
Liquid Bulk Temperature	If T_{LA} is unknown, see AP-42 7.1-23 Note 3. Not included here as T_B is always calculated. α_{TOT} is not applicable for fully insulated tanks.	62.67	70.57	68.62	58.97	48.02	35.62	24.77
Vapor Pressure at Daily Av. Liquid Surf. Temp.	Used for speciated emissions and most vapor pressures. $P_{VA,Tla}$ uses T_{LA}.	0.1099	0.1439	0.1331	0.0939	0.0618	0.0376	0.0240
Vapor Pressure at Daily Min. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VN} uses $T_{LN.}$	0.0827	0.1060	0.0988	0.0714	0.0484	0.0318	0.0204
Vapor Pressure at Daily Max. Liquid Surf. Temp.	Used for ΔP_V. Per AP-42 7.1-13 Note 5, P_{VX} uses $T_{LX.}$	0.1445	0.1928	0.1772	0.1223	0.0784	0.0443	0.0280
Daily Vapor Pressure Range	Eqn. 1-10 is alt. method per AP-42 7.1-13. Used as primary method for Petroleum Distillates & Crude. True vapor pressure based on liquid surface.	0.062	0.087	0.078	0.051	0.030	0.012	0.008
Vapor Density		0.00207	0.00267	0.00248	0.00178	0.00120	0.00075	0.00049
Vapor Space Volume		151	151	151	151	151	151	151
Standing Storage Loss	Uncontrolled emissions. No standing or breathing losses occur for underground tanks per AP-42 7.1-14.	0.57	0.85	0.77	0.44	0.26	0.10	0.06
Working Loss	Uncontrolled emissions. True vapor pressure based on liquid surface. Constant 0.0010 derived from Eqn. 1-32, 1-33, and 1-35 assuming T_{LA} = 63 °F.	0.09	0.12	0.11	0.08	0.05	0.03	0.02
Total Losses	**Uncontrolled emissions.**	**0.66**	**0.98**	**0.88**	**0.52**	**0.32**	**0.13**	**0.08**
Total Losses	**Controlled emissions, if applicable. Note: some species have 0% efficiencies with activated carbon.**	**0.66**	**0.98**	**0.88**	**0.52**	**0.32**	**0.13**	**0.08**

Chevron Oronite

Material Safety Data Sheet

SECTION 1 PRODUCT AND COMPANY IDENTIFICATION

OGA 72040

Company Identification
Chevron Oronite Company LLC
4800 Fournace Place
Bellaire, TX 77401
United States of America

Transportation Emergency Response
Asia: Chevron Emergency Information Centre +(1) 510-231-0623
Australia: 1 800 009 010
China: (+86) 138 113 09746
Europe: Oronite SA - Gonfreville Plant +33 2 35 25 55 00
North America: CHEMTREC (800) 424-9300 or (703) 527-3887
South America: Chevron Oronite Brasil Ltda (24 hours) 55 11 4478-1200
Health Emergency
USA: International collect calls accepted. (800) 231-0623 or (510) 231-0623
Product Information
MSDS Requests: (877) 512-7200
Technical Information: (877) 512-7200

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SECTION 2 COMPOSITION/ INFORMATION ON INGREDIENTS

COMPONENTS	CAS NUMBER	AMOUNT
Solvent naphtha (petroleum), light aromatic	64742-95-6	45 %wt/wt
1,2,4-trimethylbenzene	95-63-6	14 %wt/wt
01154100-5323P	Trade Secret	6 %wt/wt
01154100-5324P	Trade Secret	2 %wt/wt
Xylene	1330-20-7	1 %wt/wt

Note that the chemical identity of some or all of the above components is considered confidential business information and is being withheld as permitted by 29 CFR 1910.1200 and various State Right-To-Know Laws.

SECTION 3 HAZARDS IDENTIFICATION

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EMERGENCY OVERVIEW

- COMBUSTIBLE LIQUID AND VAPOR
- MAY CAUSE RESPIRATORY TRACT IRRITATION IF INHALED
- MAY CAUSE LUNG DAMAGE IF SWALLOWED
- MAY CAUSE DIZZINESS, DROWSINESS AND REDUCED ALERTNESS
- MAY CAUSE AN ALLERGIC SKIN REACTION

- CAUSES SKIN IRRITATION
- TOXIC TO AQUATIC ORGANISMS. MAY CAUSE LONG-TERM ADVERSE EFFECTS IN THE AQUATIC ENVIRONMENT

****

IMMEDIATE HEALTH EFFECTS

Eye: Not expected to cause prolonged or significant eye irritation.

Skin: Contact with the skin causes irritation. Skin contact may cause drying or defatting of the skin. Contact with the skin may cause an allergic skin reaction. Symptoms may include pain, itching, discoloration, swelling, and blistering. Not expected to be harmful to internal organs if absorbed through the skin.

Ingestion: Because of its low viscosity, this material can directly enter the lungs, if swallowed, or if subsequently vomited. Once in the lungs it is very difficult to remove and can cause severe injury or death. May be irritating to mouth, throat, and stomach. Symptoms may include pain, nausea, vomiting, and diarrhea.

Inhalation: Symptoms of respiratory irritation may include coughing and difficulty breathing. Excessive or prolonged breathing of this material may cause central nervous system effects. Central nervous system effects may include headache, dizziness, nausea, vomiting, weakness, loss of coordination, blurred vision, drowsiness, confusion, or disorientation. At extreme exposures, central nervous system effects may include respiratory depression, tremors or convulsions, loss of consciousness, coma or death.

SECTION 4 FIRST AID MEASURES

Eye: No specific first aid measures are required. As a precaution, remove contact lenses, if worn, and flush eyes with water.

Skin: Wash skin with water immediately and remove contaminated clothing and shoes. Get medical attention if any symptoms develop. To remove the material from skin, apply a waterless hand cleaner, mineral oil, or petroleum jelly. Then wash with soap and water. Discard contaminated clothing and shoes or thoroughly clean before reuse.

Ingestion: If swallowed, get immediate medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person. If swallowed, get medical attention. Do not induce vomiting. Never give anything by mouth to an unconscious person.

Inhalation: Move the exposed person to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention if breathing difficulties continue or if any other symptoms develop.

Note to Physicians: Ingestion of this product or subsequent vomiting may result in aspiration of light hydrocarbon liquid, which may cause pneumonitis.

SECTION 5 FIRE FIGHTING MEASURES

See Section 7 for proper handling and storage.

FIRE CLASSIFICATION:

OSHA Classification (29 CFR 1910.1200): Combustible liquid.

NFPA RATINGS: Health: 1 Flammability: 2 Reactivity: 0

FLAMMABLE PROPERTIES:

Flashpoint: (Pensky-Martens Closed Cup) 38 °C (100 °F) Minimum

Autoignition: No data available

Flammability (Explosive) Limits (% by volume in air): Lower: No data available Upper: No data available

EXTINGUISHING MEDIA: Use water fog, foam, dry chemical or carbon dioxide (CO_2) to extinguish flames.

PROTECTION OF FIRE FIGHTERS:
Fire Fighting Instructions: For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.
Combustion Products: Highly dependent on combustion conditions. A complex mixture of airborne solids, liquids, and gases including carbon monoxide, carbon dioxide, and unidentified organic compounds will be evolved when this material undergoes combustion. Combustion may form oxides of: Nitrogen .

SECTION 6 ACCIDENTAL RELEASE MEASURES

Protective Measures: Eliminate all sources of ignition in the vicinity of the spill or released vapor. If this material is released into the work area, evacuate the area immediately. Monitor area with combustible gas indicator.
Spill Management: Stop the source of the release if you can do it without risk. Contain release to prevent further contamination of soil, surface water or groundwater. Clean up spill as soon as possible, observing precautions in Exposure Controls/Personal Protection. Use appropriate techniques such as applying non-combustible absorbent materials or pumping. All equipment used when handling the product must be grounded. A vapor suppressing foam may be used to reduce vapors. Use clean non-sparking tools to collect absorbed material. Where feasible and appropriate, remove contaminated soil. Place contaminated materials in disposable containers and dispose of in a manner consistent with applicable regulations.
Reporting: Report spills to local authorities and/or the U.S. Coast Guard's National Response Center at (800) 424-8802 as appropriate or required.

SECTION 7 HANDLING AND STORAGE

Precautionary Measures: Liquid evaporates and forms vapor (fumes) which can catch fire and burn with explosive force. Invisible vapor spreads easily and can be set on fire by many sources such as pilot lights, welding equipment, and electrical motors and switches. Fire hazard is greater as liquid temperature rises above 29C (85F).
Do not get in eyes, on skin, or on clothing. Do not taste or swallow. Wash thoroughly after handling.
General Handling Information: Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.
Static Hazard: Electrostatic charge may accumulate and create a hazardous condition when handling this material. To minimize this hazard, bonding and grounding may be necessary but may not, by themselves, be sufficient. Review all operations which have the potential of generating and accumulating an electrostatic charge and/or a flammable atmosphere (including tank and container filling, splash filling, tank cleaning, sampling, gauging, switch loading, filtering, mixing, agitation, and vacuum truck operations) and use appropriate mitigating procedures. For more information, refer to OSHA Standard 29 CFR 1910.106, 'Flammable and Combustible Liquids', National Fire Protection Association (NFPA 77, 'Recommended Practice on Static Electricity', and/or the American Petroleum Institute (API) Recommended Practice 2003, 'Protection Against Ignitions Arising Out of Static, Lightning, and Stray Currents'.
General Storage Information: DO NOT USE OR STORE near heat, sparks, flames, or hot surfaces . USE AND STORE ONLY IN WELL VENTILATED AREA. Keep container closed when not in use.
Container Warnings: Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner or disposed of properly.

SECTION 8 EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:
Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS:
Use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended exposure limits.

PERSONAL PROTECTIVE EQUIPMENT
Eye/Face Protection: No special eye protection is normally required. Where splashing is possible, wear safety glasses with side shields as a good safety practice.
Skin Protection: Wear protective clothing to prevent skin contact. Selection of protective clothing may include gloves, apron, boots, and complete facial protection depending on operations conducted. Suggested materials for protective gloves include: Nitrile Rubber, Polyurethane, Viton.
Respiratory Protection: Determine if airborne concentrations are below the recommended occupational exposure limits for jurisdiction of use. If airborne concentrations are above the acceptable limits, wear an approved respirator that provides adequate protection from this material, such as: Air-Purifying Respirator for Organic Vapors.

Use a positive pressure air-supplying respirator in circumstances where air-purifying respirators may not provide adequate protection.

Occupational Exposure Limits:

Component	Agency	TWA	STEL	Ceiling	Notation
1,2,4-trimethylbenzene	ACGIH	25 ppm (weight)	--	--	--
Xylene	ACGIH	100 ppm (weight)	150 ppm (weight)	--	A4
Xylene	OSHA Z-1	435 mg/m3	--	--	--

Consult local authorities for appropriate values.

SECTION 9 PHYSICAL AND CHEMICAL PROPERTIES

Attention: the data below are typical values and do not constitute a specification.

Color: Amber
Physical State: Liquid
Odor: Hydrocarbon odor
pH: Not Applicable
Vapor Pressure: No data available
Vapor Density (Air = 1): No data available
Boiling Point: No data available
Solubility: Insoluble in water.
Freezing Point: No data available
Melting Point: No data available
Specific Gravity: 0.9211 @ 15.6°C (60°F)
Density: 0.9194 kg/l @ 15°C (59°F)
Viscosity: 7.1 cSt @ 40°C (104°F) Minimum
Coefficient of Therm. Expansion / °F: 0.00044

Evaporation Rate: No data available

SECTION 10 STABILITY AND REACTIVITY

Chemical Stability: This material is considered stable under normal ambient and anticipated storage and handling conditions of temperature and pressure.
Conditions to Avoid: Do not heat above flash point.
Incompatibility With Other Materials: May react with strong acids or strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.
Hazardous Decomposition Products: None known (None expected)
Hazardous Polymerization: Hazardous polymerization will not occur.

SECTION 11 TOXICOLOGICAL INFORMATION

IMMEDIATE HEALTH EFFECTS

Eye Irritation: The eye irritation hazard is based on evaluation of data for similar materials or product components.
Skin Irritation: The skin irritation hazard is based on evaluation of data for similar materials or product components.
Skin Sensitization: The skin sensitization hazard is based on evaluation of data for similar materials or product components.
Acute Dermal Toxicity: The acute dermal toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Oral Toxicity: The acute oral toxicity hazard is based on evaluation of data for similar materials or product components.

Acute Inhalation Toxicity: The acute inhalation toxicity hazard is based on evaluation of data for similar materials or product components.

ADDITIONAL TOXICOLOGY INFORMATION:

COMPONENT: Light Aromatic Solvent Naphtha (CAS 64742-95-6, also described as High-Flash Aromatic Naphtha, Type I, as defined by ASTM D-3734).
GENETIC TOXICITY: No evidence of genetic toxicity was observed in the following tests: Salmonella typhimurium reverse mutation assay (Ames test), in vitro Chinese Hamster Ovary (CHO) cell HGPRT mutation assay, in vitro Chinese Hamster Ovary (CHO) cell chromosomal aberration assay, in vitro Chinese Hamster Ovary (CHO) cell sister chromatid exchange assay, and in vivo rat bone marrow chromosome aberration assay.
SUBCHRONIC TOXICITY: In a 13-week rat inhalation study using dose levels of 0, 100, 500, and 1500 ppm for 6 hours/day, 5 days/week, no target organ toxicity including neurotoxicity was observed at any dose level. Slight general systemic toxicity (decreased body weight gain) was observed at 1500 ppm.
GENETIC TOXICITY/CARCINOGENICITY: Xylene was not genotoxic in several mutagenicity testing assays including the Ames test. In a cancer study sponsored by the National Toxicology Program (NTP),technical grade xylene gave no evidence of carcinogenicity in rats or mice dosed daily for two years.
HEARING: Mixed xylenes have been shown to cause measurable hearing loss in rats exposed to 800 ppm in the air for 14 hours per day for six weeks. Exposure to 1450 ppm xylene for 8 hours caused hearing loss while exposure to 1700 ppm for 4 hours did not.Although no information is available for lower concentrations, other chemicals that cause hearing loss in rats at relatively high concentrations do not cause hearing loss in rats at low concentrations. Worker exposure to xylenes at the permissible exposure limit (100 ppm, time-weighted average) is not expected to cause hearing loss. This product contains xylene.
ACUTE TOXICITY: The primary effects of exposure to xylene in animals and humans are on the central nervous system. In addition,in some individuals, xylene exposure can sensitize cardiac tissue to epinephrine which may precipitate fatal ventricular fibrillation.

DEVELOPMENTAL TOXICITY: Xylene has been reported to cause developmental toxicity in rats and mice exposed by inhalation during pregnancy. The effects noted consisted of delayed development and minor skeletal variations. In addition, when pregnant mice were exposed by ingestion to a level that killed nearly one-third of the test group, lethality (resorptions) and malformations (primarily cleft palate) occurred. Since xylene can cross the placenta, it may be appropriate to prevent exposure during pregnancy.
DEVELOPMENTAL TOXICITY: In a mouse inhalation study using dose levels of 0, 100, 500, and 1500 ppm for 6 hours/day on gestation days 6-15, no signs of maternal toxicity or developmental toxicity were observed at 100 ppm. At 500 ppm, maternal toxicity (decreased body weight gain) and developmental toxicity (decreased fetal body weight) were observed. Severe maternal toxicity (44% mortality, decreased body weight gain, clinical signs of toxicity) and developmental toxicity (decreased number of live fetuses per litter, increased post-implantation losses per dam, decreased fetal body weights, delayed ossification, cleft palate) were observed at 1500 ppm. In a rat inhalation study using dose levels of 600, 1000, and 2000 mg/m3 for 24 hours/day on gestation days 7-15, signs of maternal toxicity (decreased body weight gain) were observed at all dose levels. At 600 mg/m3, no signs of fetal or developmental toxicity were observed. Signs of fetal toxicity (decreased male fetal body weight) and developmental toxicity (delayed ossification) were observed at 1000 and 2000 mg/m3.
REPRODUCTIVE TOXICITY: In a rat 3-generation inhalation study using dose levels of 0, 100, 500, and 1500 ppm for 6 hours/day, 5 days/week, no signs of general systemic or reproductive toxicity were observed at 100 ppm. At 500 ppm, slight parental toxicity (decreased body weight gain) and postnatal toxicity (decreased pup body weight) were observed, but reproductive parameters were not affected. Severe parental toxicity (mortality, decreased body weight gain, clinical signs of toxicity) and postnatal toxicity (decreased pup body weight) were observed at 1500 ppm, but reproductive parameters were not affected.

SECTION 12 ECOLOGICAL INFORMATION

ECOTOXICITY

This material is expected to be toxic to aquatic organisms and may cause long-term adverse effects in the aquatic environment. The ecotoxicity hazard is based on an evaluation of data for the components or a similar material.

ENVIRONMENTAL FATE

Ready Biodegradability: This material is not expected to be readily biodegradable. The biodegradability of this material is based on an evaluation of data for the components or a similar material.

SECTION 13 DISPOSAL CONSIDERATIONS

Use material for its intended purpose or recycle if possible. This material, if it must be discarded, may meet the criteria of a hazardous waste as defined by US EPA under RCRA (40 CFR 261) or other State and local regulations. Measurement of certain physical properties and analysis for regulated components may be necessary to make a correct determination. If this material is classified as a hazardous waste, federal law requires disposal at a licensed hazardous waste disposal facility.

SECTION 14 TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT Shipping Description: UN1993, FLAMMABLE LIQUID, N.O.S. (PETROLEUM LIGHT AROMATIC SOLVENT NAPHTHA), 3, III, RQ (XYLENE), MARINE POLLUTANT (POLYETHER AMINE, PETROLEUM LIGHT AROMATIC SOLVENT NAPHTHA)

IMO/IMDG Shipping Description: UN1993, FLAMMABLE LIQUID, N.O.S. (PETROLEUM LIGHT AROMATIC SOLVENT NAPHTHA), 3, III, (38C), MARINE POLLUTANT (POLYETHER AMINE, PETROLEUM LIGHT AROMATIC SOLVENT NAPHTHA)

ICAO/IATA Shipping Description: UN1993, FLAMMABLE LIQUID, N.O.S. (PETROLEUM LIGHT AROMATIC SOLVENT NAPHTHA), 3, III

SECTION 15 REGULATORY INFORMATION

EPCRA 311/312 CATEGORIES:

1.	Immediate (Acute) Health Effects:	YES
2.	Delayed (Chronic) Health Effects:	NO
3.	Fire Hazard:	YES
4.	Sudden Release of Pressure Hazard:	NO
5.	Reactivity Hazard:	NO

REGULATORY LISTS SEARCHED:

01-1=IARC Group 1	03=EPCRA 313
01-2A=IARC Group 2A	04=CA Proposition 65
01-2B=IARC Group 2B	05=MA RTK
02=NTP Carcinogen	06=NJ RTK
	07=PA RTK

The following components of this material are found on the regulatory lists indicated.

1,2,4-trimethylbenzene	05, 06, 07
Xylene	05, 06, 07

CHEMICAL INVENTORIES:
All components comply with the following chemical inventory requirements: DSL (Canada), EINECS (European Union), KECI (Korea), PICCS (Philippines), TSCA (United States).

One or more components does not comply with the following chemical inventory requirements: AICS (Australia), ENCS (Japan).

WHMIS CLASSIFICATION:
Class B, Division 3: Combustible Liquids
Class D, Division 2, Subdivision B: Toxic Material -
Skin or Eye Irritation
Skin Sensitization

SECTION 16 OTHER INFORMATION

NFPA RATINGS: Health: 1 Flammability: 2 Reactivity: 0

HMIS RATINGS: Health: 2 Flammability: 2 Reactivity: 0
(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

LABEL RECOMMENDATION:
Oronite Label Code : W1IE.

REVISION STATEMENT: This revision updates the following sections of this Material Safety Data Sheet: 9,16.
Revision Date: MAY 18, 2012

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value	TWA - Time Weighted Average
STEL - Short-term Exposure Limit	PEL - Permissible Exposure Limit
	CAS - Chemical Abstract Service Number
ACGIH - American Conference of Governmental Industrial Hygienists	IMO/IMDG - International Maritime Dangerous Goods Code
API - American Petroleum Institute	MSDS - Material Safety Data Sheet
CVX - Chevron	NFPA - National Fire Protection Association (USA)
DOT - Department of Transportation (USA)	NTP - National Toxicology Program (USA)
IARC - International Agency for Research on Cancer	OSHA - Occupational Safety and Health Administration

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Chevron Energy Technology Company, 100 Chevron Way, Richmond, California 94802.

The above information is based on the data of which we are aware and is believed to be correct as of the date hereof. Since this information may be applied under conditions beyond our control and with which we may be unfamiliar and since data made available subsequent to the date hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.

New on Nov 4, 2014 TK 23

Safety Data Sheet

NEMO 1124E

MSDS no. NEMO1124E

1. Product and company identification

Product use Petrochemical industry: Fuel additive.

Date of issue/Revisions **7 October 2014**

In case of emergency - Chemical

+1-703-527-3887 (International)
+65-3158-1349 (Asia Pacific)
+61-290372994 (Australia)
+32-28083237 (Belgium)
4001-204937 (China)
+385-17776920 (Croatia)
000-800-100-7141 (India)
+81-345209637 (Japan)
00-308-13-2549 (South Korea)
+1-703-741-5979 (Spanish language)
+44-870-8200418 (UK)
1-800-424-9300 (US & Canada)

Manufacturer / Supplier

Afton Chemical Corporation
500 Spring St.
Richmond,
VA 23219
USA
Telephone number: +1-804-788-5800

Afton Chemical Hyderabad Pvt. Ltd.
Plot No. 197, IDA, Phase II
Cherlapally
Hyderabad-- 500051 India

Afton Chemical Limited
Euro-Tech Centre
London Road, Bracknell, Berkshire
RG12 2UW, England
Telephone Number: +44 1344 304141
msds@aftonchemical.com

Afton Chemical Asia Pte. Ltd.
111 Somerset Road
#09-05
TripleOne Somerset
Singapore 238164
Telephone number: +65 6732 0822
Fax: +65 6737 4123

Afton Chemical Limited
Ashburton Road West, Trafford Park
Manchester, M17 1SX, England
Telephone number: +44 (0)161 876 5673
(Weekdays, 9am - 5pm)
Email: msds.mwf@aftonchemical.com

Afton Chemical Corporation
7201 W. 65th Street
Bedford Park, IL 60638, USA
Tel: (708) 458-8450 (Non-emergency)
(800) 323-3231 (Customer Service)

2. HAZARDS IDENTIFICATION

Notice to reader

Afton operates a world-wide system for hazard communication. Some hazards shown in Section 2 may apply to non-EU countries and may not result in classification and labeling in the EU. Please see Sections 3 and 15 for country specific classification information, and Section 11 for additional details.

Europe: The product is classified as dangerous according to Directive 1999/45/EC and its amendments.

Australia: HAZARDOUS SUBSTANCE. DANGEROUS GOODS.

Primary hazards and critical effects : Warning.
CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
Contains material which may cause cancer. Risk of cancer depends on duration and level of exposure.

Physical/chemical hazards : COMBUSTIBLE. - United States and Canada
FLAMMABLE. - European Union
VAPOR MAY CAUSE FLASH FIRE.

Environmental hazards : Toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

Hazardous Material Information System (U.S.A.)

Health	1
[illegible]	[illegible]
Reactivity	0

GHS Classification

Hazard classification : FLAMMABLE LIQUIDS - Category 3
SKIN CORROSION/IRRITATION - Category 2
SERIOUS EYE DAMAGE/ EYE IRRITATION - Category 2
CARCINOGENICITY - Category 2
SPECIFIC TARGET ORGAN TOXICITY (SINGLE EXPOSURE) (Respiratory tract irritation and Narcotic effects) - Category 3
ASPIRATION HAZARD - Category 1
AQUATIC HAZARD (LONG-TERM) - Category 2

Symbol :

Signal word : Danger

Hazard statements : Flammable liquid and vapor.
Causes serious eye irritation.
Causes skin irritation.
Suspected of causing cancer.
May be fatal if swallowed and enters airways.
May cause respiratory irritation.
May cause drowsiness and dizziness.
Toxic to aquatic life with long lasting effects.

Precautionary statements

Prevention : Obtain special instructions before use. Do not handle until all safety precautions have been read and understood. Wear protective gloves. Wear eye or face protection. Wear protective clothing. Keep away from heat, sparks, open flames and hot surfaces. - No smoking. Use explosion-proof electrical, ventilating, lighting and all material-handling equipment. Use only non-sparking tools. Take precautionary measures against static discharge. Keep container tightly closed. Use only outdoors or in a well-ventilated area. Avoid release to the environment. Avoid breathing vapor. Wash hands thoroughly after handling.

Response : Collect spillage. IF exposed or concerned: Get medical attention. IF INHALED: Remove person to fresh air and keep comfortable for breathing. Call a POISON CENTER or physician if you feel unwell. IF SWALLOWED: Immediately call a POISON CENTER or physician. Do NOT induce vomiting. IF ON SKIN (or hair): Take off immediately all contaminated clothing. Rinse skin with water or shower. IF ON SKIN: Wash with plenty of soap and water. Take off contaminated clothing and wash it before reuse. If skin irritation occurs: Get medical attention. IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing. If eye irritation persists: Get medical attention.

Storage : Store locked up. Store in a well-ventilated place. Keep cool.

Disposal : Dispose of contents and container in accordance with all local, regional, national and international regulations.

3. Composition/information on ingredients

Note: see section 8 for occupational exposure limits and section 11 for LC50/LD50 information.

Substance/Preparation : Preparation

Ingredient name	CAS no.	Conc. (% w/w)	EU Classification	WHMIS Regulated?
Solvent naphtha (petroleum), light aromatic	64742-95-6	30 - 60	R10 Xn; R65 Xi; R37 R66, R67 N; R51/53	Yes.
Polyolefin alkyl phenol alkyl amine	Proprietary	20 - 30	Xi; R38	Yes.
Benzene, 1,2,4-trimethyl-	95-63-6	10 - 19.9	R10 Xn; R20 Xi; R36/37/38 N; R51/53	Yes.
Benzene, 1,3,5-trimethyl-	108-67-8	5 - 9.9	R10 Xi; R37 N; R51/53	Yes.
n-Propylbenzene	103-65-1	1 - 4.9	R10 Xn; R65 Xi; R37 N; R51/53	Yes.
Polyolefin alkyl phenol alkyl amine	Proprietary	1 - 4.9	Xi; R36/38	Yes.
Xylene	1330-20-7	1 - 4.9	R10 Xn; R20/21 Xi; R38	Yes.
2-Ethyl hexanol	104-76-7	1 - 4.9	Xn; R20 Xi; R36/37/38	Yes.

Cumene	98-82-8	1 - 4.9	R10 Xn; R65 Xi; R37 N; R51/53	Yes.
Benzene, 1,2,3-trimethyl-	526-73-8	1 - 4.9	R10 Xi; R36/38	Yes.
Solvent naphtha (petroleum), heavy aromatic	64742-94-5	1 - 4.9	Xn; R65 R66, R67 N; R51/53	Yes.
Long-chain alkyl acid	Proprietary	0.1 - 0.5	Xi; R36/38 R53	Yes.
Naphthalene	91-20-3	0.1 - 0.5	Carc. Cat. 3; R40 Xn; R22 N; R50/53	Yes.

4. First aid measures

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion : If affected person is fully conscious, give one glass of water to drink. Never give anything by mouth to an unconscious person. Get medical attention if symptoms appear.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately.

Eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

5. Fire-fighting measures

Extinguishing media : In case of fire, use water spray (fog), foam, dry chemical or CO_2.

Fire-fighting procedures : Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.

Fire/explosion hazards : COMBUSTIBLE. - United States and Canada FLAMMABLE. - European Union
VAPOR MAY CAUSE FLASH FIRE. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Hazardous decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides (NO, NO_2 etc.)

Flash point : Closed cup: 42°C (107.6°F) [Pensky-Martens. Minimum]

6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Follow all fire-fighting procedures (section 5). Do not touch or walk through spilled material.

Environmental precautions and clean-up methods : If emergency personnel are unavailable, contain spilled material. For small spills, add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion-proof means to transfer material to a sealable, appropriate container for disposal. For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal. Avoid contact of spilled material with soil and prevent runoff entering surface waterways.

Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

7. Handling and storage

Handling : Avoid contact with eyes, skin and clothing. Keep container closed. Use only with adequate ventilation. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling.

Storage : Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

8. Exposure controls/personal protection

Engineering controls : Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal protective equipment

Respiratory system : Use appropriate respiratory protection if there is the potential to exceed the exposure limit(s).

Skin and body : Where contact is likely, wear chemical resistant gloves, a chemical resistant suit, and boots. Additional body garments should be used based upon the task being performed.

Hands : Hand Protection: Wear chemical resistant gloves. Nitrile gloves of minimum thickness 0.4 mm have an expected breakthrough time of 30 minutes or less when in frequent contact with the product. Due to variable exposure conditions the user must consider that the practical use of a chemical-protective glove in practice may be much shorter than the permeation time above. Manufacturer's directions for use, especially about the minimum thickness and the minimum breakthrough time, must be observed. This information does not replace suitability tests by the end user since glove protection varies depending on the conditions under which the product is used.

Eyes : Safety goggles are considered minimum protection. Goggles with a face shield may be necessary depending on quantity of material and conditions of use.

Occupational exposure limits

Ingredient name	OEL United States	OEL Canada	OEL Europe	OEL Australia
1) Benzene, 1,2,4-trimethyl-	**ACGIH (United States, 1999).** TWA: 25 ppm	(Canada). TWA: 25 ppm	**EH40 (UK) (Europe).** TWA: 25 ppm	**ACGIH (United States, 1999).** TWA: 25 ppm
2) Benzene, 1,3,5-trimethyl-	**ACGIH (United States, 1999).** TWA: 25 ppm	(Canada). TWA: 25 ppm	**EH40 (UK) (Europe).** TWA: 25 ppm	**ACGIH (United States, 1999).** TWA: 25 ppm
3) Xylene	**ACGIH (United States, 1996).** TWA: 100 ppm STEL: 150 ppm **OSHA (United States).** TWA: 100 ppm	(Canada). TWA: 100 STEL: 150	**EH40 (UK) (Europe, 2002). Absorbed through skin.** TWA: 50 ppm 8 hours. STEL: 100 ppm 15 minutes.	**NOHSC (Australia, 2003).** STEL: 80 ppm 15 minutes.
4) Cumene	**ACGIH (United States, 1994). Absorbed through skin.** TWA: 50 ppm **OSHA (United States, 1989). Absorbed through skin.** TWA: 50 ppm	(Canada). Absorbed through skin. TWA: 50 ppm	**EH40 (UK) (Europe). Absorbed through skin.** TWA: 25 ppm 8 hours. **EH40 (UK) (Europe, 2002). Absorbed through skin.** TWA: 125 mg/m³ 8 hours. STEL: 250 mg/m³ 15 minutes.	**NOHSC (Australia, 2003). Absorbed through skin.** TWA: 25 ppm 8 hours. STEL: 75 ppm 15 minutes.
5) Benzene, 1,2,3-trimethyl-	**ACGIH (United States, 1999).** TWA: 25 ppm	(Canada). TWA: 25 ppm	**ACGIH (United States, 1999).** TWA: 25 ppm (Canada). TWA: 25 ppm	**ACGIH (United States, 1999).** TWA: 25 ppm
6) Solvent naphtha (petroleum), heavy aromatic	**OSHA (United States).** TWA: 500 ppm 8 hours. TWA: 2000 mg/m³ 8 hours.	**OSHA (United States).** TWA: 500 ppm 8 hours. TWA: 2000 mg/m³ 8 hours.	**OSHA (United States).** TWA: 500 ppm 8 hours. TWA: 2000 mg/m³ 8 hours.	**OSHA (United States).** TWA: 500 ppm 8 hours. TWA: 2000 mg/m³ 8 hours.
7) Naphthalene	**ACGIH TLV (United States). Absorbed through skin.** TWA: 10 ppm STEL: 15 ppm **OSHA PEL (United States).** TWA: 10 ppm	**ACGIH TLV (United States). Absorbed through skin.** TWA: 10 ppm STEL: 15 ppm	**EU OEL (Europe).** TWA: 10 ppm 8 hours. TWA: 50 mg/m³ 8 hours. Form: EH40/2005	**ACGIH TLV (United States). Absorbed through skin.** TWA: 10 ppm STEL: 15 ppm

9. Physical and chemical properties

Physical state and Appearance : Liquid.
Color : Amber.
Odor : Aromatic.
Specific gravity : 0.9199 @15.6/15.6°C
Viscosity : 16.35 cSt at 40°C
Auto-ignition temperature : Not determined.
Flash point : Closed cup: 42°C (107.6°F) [Pensky-Martens. Minimum]

10. Stability and reactivity

Stability : The product is stable.
Materials to avoid : Strong oxidizing and reducing agents.
Conditions to avoid : High temperatures, sparks, and open flames.

11. Toxicological information

Routes of entry : Skin, Eyes, Ingestion, and Inhalation.
Target organs : Contains material which may cause damage to the following organs: blood, kidneys, lungs, liver, heart, gastrointestinal tract, upper respiratory tract, immune system, skin, eyes, central nervous system (CNS).

Acute effects

Inhalation : Irritating to respiratory system.
Ingestion :
Ingestion may cause gastrointestinal irritation and diarrhea.
Skin contact : Irritating to skin.
Eye contact : Irritating to eyes.
Does not meet EU R41 or R36 classification criteria.

Adverse effects : - Adverse symptoms may include the following:: In the presence of slight maternal toxicity, fetotoxic effects have been observed in the offspring of rats exposed by inhalation to Solvent Naphtha (petroleum) light aromatic.
- Adverse symptoms may include the following:: This product contains trimethylbenzene. Literature data indicate that long-term inhalation exposure causes blood effects in laboratory animals.
- Adverse symptoms may include the following:: Central nervous system, liver, kidneys, and blood effects by inhalation and heart beat irregularity (arrythmia) and heart beat - increase. High exposures to xylene in some animal studies, often at levels toxic to the mother, affected embryo/fetal development. The significance of this finding to humans is not known. Xylene vapor has caused occupational skin sensitization in humans. When exposed to 1800 ppm Xylene vapor, rats experienced hearing deficits to mid-frequency range tones.
- Adverse symptoms may include the following:: liver, kidneys, lungs, and heart effects by dermal route and immune system effects by ingestion route. Not a developmental toxicant when administered dermally. Weak carcinogenic liver response was observed in mice, but not rats.

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA	EU
Xylene	A4	-	-	-	-	-	-
Naphthalene	-	2B	-	-	Reasonably anticipated to be a human carcinogen.	-	Limited evidence of a carcinogenic effect.

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure

Solvent naphtha (petroleum), light aromatic	LD50 Oral	Rat	8400 mg/kg	-
	LD50 Oral	Rat	5000 mg/kg	-
	LD50 Oral	Rat	2900 mg/kg	-
Polyether polyol	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
Benzene, 1,2,4-trimethyl-	LD50 Dermal	Rabbit	3160 mg/kg	-
	LD50 Oral	Rat	5000 mg/kg	-
	LD50 Oral	Rat	3400 to 6000 mg/kg	-
	LC50 Inhalation Vapor	Rat	18000 mg/m³	4 hours
Benzene, 1,3,5-trimethyl-	LD50 Oral	Rat	>5000 mg/kg	-
	LC50 Inhalation Vapor	Rat	24000 mg/m³	4 hours
n-Propylbenzene	LD50 Oral	Rat	6040 mg/kg	-
Long chain alkenyl heterocycle	LD50 Oral	Rat	14000 mg/kg	-
Xylene	LD50 Dermal	Rabbit	>14100 mg/kg	-
	LD50 Oral	Rat	4300 mg/kg	-
	LD50 Oral	Rat - Male	3523 mg/kg	-
	LC50 Inhalation Vapor	Rat	5000 to 8500 ppm	4 hours
2-Ethyl hexanol	LD50 Dermal	Rat	>3000 mg/kg	-
	LD50 Oral	Rat	2040 mg/kg	-
	LC50 Inhalation Vapor	Rat	0.89 to 5.3 mg/l	4 hours
Cumene	LD50 Dermal	Rabbit	10578 mg/kg	-
	LD50 Oral	Mouse	12750 mg/kg	-
	LD50 Oral	Rat	1400 mg/kg	-
	LC50 Inhalation Vapor	Rat	8000 ppm	4 hours
Polyolefin	LD50 Dermal	Rat	>5000 mg/kg	-
	LD50 Oral	Rat	>10000 mg/kg	-
Solvent naphtha (petroleum), heavy aromatic	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>2500 mg/kg	-
	LC50 Inhalation Vapor	Rat	>11.67 mg/m³	6 hours

12. Ecological information

Environmental hazards : Toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment. Based on calculation.

Environmental fate : This product contains components which may be persistent in the environment.

13. Disposal considerations

Waste handling and disposal : Waste must be disposed of in accordance with federal, state and local environmental control regulations.

14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	NA1993	Combustible liquids, n.o.s. (Xylene, Petroleum distillates)	Combustible liquid.	III		Non-bulk packages (less than or equal to 119 gal) of combustible liquids are not regulated as hazardous materials in package sizes less than the product reportable quantity. **Reportable quantity** 3545.6 lbs / 1609.7 kg Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements.

TDG Classification	UN1993	Flammable liquid, n.o.s. (Xylene, Petroleum distillates). Marine pollutant	3	III		The marine pollutant mark is not required when transported by road or rail.
ADR/RID Class	UN1993	Flammable liquid, n.o.s. (Xylene, Petroleum distillates)	3	III		**Hazard identification number** 30 **Special provisions** 640 (E) **Tunnel code** (D/E)
IMDG Class	UN1993	Flammable liquid, n.o.s. (Xylene, Petroleum distillates). Marine pollutant	3	III		The marine pollutant mark is not required when transported in sizes of ≤5 L or ≤5 kg.
IATA-DGR Class	UN1993	Flammable liquid, n.o.s. (Xylene, Petroleum distillates)	3	III		The environmentally hazardous substance mark may appear if required by other transportation regulations.
ADG Class	UN1993	Flammable liquid, n.o.s. (Xylene, Petroleum distillates)	3	III		-

Notice to reader

The above transport information is provided to assist in the proper classification of this product and may not be suitable for all shipping conditions.

15. Regulatory information

EU regulations

Hazard symbol(s) :

Irritant, Dangerous for the environment

Risk phrases : R10- Flammable.
R37/38- Irritating to respiratory system and skin.
R67- Vapors may cause drowsiness and dizziness.
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety phrases : S16- Keep away from sources of ignition - No smoking.
S23- Do not breathe vapor.
S37- Wear suitable gloves.
S57- Use appropriate containment to avoid environmental contamination.

US regulations

SARA 313 toxic chemical notification and release reporting (w/w%) :

Benzene, 1,2,4-trimethyl-	10 - 19.9
Xylene	1 - 4.9
Cumene	1 - 4.9
Naphthalene	0.1 - 0.5

SARA 311/312 Hazardous Categorization : **SARA 311/312 Hazards identification:** Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard

RQ (Reportable quantity) : CERCLA: Hazardous substances.: Xylene: 100 lbs. (45.4 kg); Cumene: 5000 lbs. (2270 kg); Ethylbenzene: 1000 lbs. (454 kg); Naphthalene: 100 lbs. (45.4 kg); Styrene: 1000 lbs. (454 kg); Toluene: 1000 lbs. (454 kg); Benzene: 10 lbs. (4.54 kg); p-Xylene: 100 lbs. (45.4 kg); Acetaldehyde: 1000 lbs. (454 kg); Furan: 100 lbs. (45.4 kg); Propylene oxide: 100 lbs. (45.4 kg); o-XYLENE: 1000 lbs. (454 kg); Maleic Anhydride: 5000 lbs. (2270 kg);

:

State - California Prop. 65 This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute:
Cumene
Naphthalene
Ethylbenzene
Toluene
Benzene
Furan
Propylene oxide
Acetaldehyde

EPA Significant New Use Rule (SNUR)	: Polyolefin alkyl phenol alkyl amine	United States - TSCA 5(a)2 - Proposed significant new use rules
	Polyolefin alkyl phenol alkyl amine	United States - TSCA 5(a)2 - Proposed significant new use rules
EPA Consent Order	: Polyolefin alkyl phenol alkyl amine	United States - TSCA 5(e) - Substances consent order

Canadian regulations

WHMIS (Classification) : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

International Inventory Status

United States inventory (TSCA 8b)	: All components are listed or exempted.
Canada inventory	: At least one component is not listed in DSL but all such components are listed in NDSL.
Europe inventory	: All components are listed or exempted.
Japan inventory (ENCS)	: At least one component is not listed.
Australia inventory (AICS)	: At least one component is not listed.
Korea inventory (KECI)	: At least one component is not listed.
China inventory (IECSC)	: At least one component is not listed.
Philippines inventory (PICCS)	: All components are listed or exempted.
New Zealand Inventory of Chemicals (NZIoC)	: All components are listed or exempted.

16. Other information

PREPARATION INFORMATION

Validated by HS&E Department (Tel: +1 804 788 5800) on 10/7/2014.

Date of printing : **10/7/2014.**

Indicates information that has changed from previously issued version.

Notice to reader

This information and these recommendations are offered in good faith and believed to be correct as of the date hereof. Information and recommendations are supplied upon the condition that the recipients will make their own decision as to safety and suitability for their purposes. No representations or warranties, either expressed or implied, of merchantability, fitness for a particular purpose, or of any other nature, are made with respect to the product or the information and recommendations. Afton makes no representation as to completeness or accuracy. In no event will Afton be responsible for damages of any nature whatsoever resulting from the use or reliance upon the information and recommendations.

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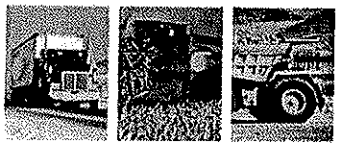
Telephone number: +61 2801 44558
Business Hours: 9:00am - 5:00pm

In China:
Afton Chemical Trading (Beijing) Co., Ltd.
Room 707 China World Office 1
No. 1 Jian Guo Men Wai Avenue
Beijing 100004 China
Telephone number: +86 10 6535 0000

Full text of R-phrases appearing in section 3: : R10- Flammable.
R40- Limited evidence of a carcinogenic effect.
R20- Harmful by inhalation.
R22- Harmful if swallowed.
R20/21- Harmful by inhalation and in contact with skin.
R65- Harmful: may cause lung damage if swallowed.
R37- Irritating to respiratory system.
R38- Irritating to skin.
R36/38- Irritating to eyes and skin.
R36/37/38- Irritating to eyes, respiratory system and skin.
R43- May cause sensitization by skin contact.
R66- Repeated exposure may cause skin dryness or cracking.
R67- Vapors may cause drowsiness and dizziness.
R50/53- Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.
R53- May cause long-term adverse effects in the aquatic environment.

***** END OF MSDS *****



Performance Specialties

Legal Diesel™ Fuel Additive RT-2W/80

RT-2W/80 is a winter multifunctional middle distillate fuel additive. It provides better combustion and improved low temperature operability of diesel fuel.

Innospec Fuel Specialties is the only manufacturing company solely focused on fuel and fuel additive technology.

RT-2W/80 provides the following performance benefits:

- Lowers Cold Filter Plugging Point
- Lowers Pour Point
- Prevents fuel gelling in low temperatures
- Disperses wax during extended engine shutdowns in cold climates
- Increases cetane number
- Aids against fuel filter icing
- Water dispersant to help safely remove water on a gradual basis
- Contains corrosion inhibitor
- Contains diesel detergent

Addition

RT-2W/80 may be continuously blended into diesel fuel as a concentrate or as a stock solution. Proper blending and handling procedures must be followed due to the nature of all low temperature operability additives. Blend the additive with the fuel at temperatures at least 10°C above the cloud point of the fuel. Ensure the additive is at or above the minimum handling temperatures to avoid potential performance issues. Verify that the additive is completely dissolved into the fuel.

Material Compatibility

RT-2W/80 is compatible with the following materials of construction: mild steel, aluminum, 304 stainless steel, 316 stainless steel, Teflon, and Viton. Do not use with Hypalon, polyethylene, polypropylene, neoprene, Buna-N, or natural rubber. Copper, brass, or bronze (yellow metals) should not be used with neat additive.

Personal Safety, First Aid and Storage and Handling

See the Material Safety Data Sheet for product specific information.

40CFR80.591 Compliance Statement:
The sulfur content of this diesel fuel additive does not exceed 15 ppm. This is a LEGAL DIESEL ™ Fuel Additive product.

Typical Properties

Appearance	clear yellow liquid
Specific Gravity, 60/60°F (15.6/15.6°C)	0.887
Density, lb./gal. 60°F, (15.6°C)	7.38
Flash Point, PMCC, °F (°C)	86 (30)
Pour Point, °F (°C)	-32.8 (-36)
Viscosity, cSt @ 100°F (37.8°C)	2
68°F (20°C)	2
32°F (0°C)	3
0°F (-32°C)	4

Treat Rate Range

1:1500 (667 ppm vol.) 1:750 (1333 ppm vol.)

Treat rates may vary due to regional fuel characteristics. Please contact your regional Innospec representative for recommendations. Registered EPA Maximum treat rate is 3000 ppm.

Technical Support: (302) 454-8100

Customer Service Resource Center: (800) 441-9547

innospec

Edition hh1
Issue 1
9/2008

RT-2W-80 hh1
Material Safety Data Sheet

1. Product and company identification

Common name	:	RT-2W-80 hh1
Internal code	:	IFS0092
Supplier	:	Innospec Fuel Specialties LLC North American Headquarters 8375 South Willow Street Littleton Colorado 80124 USA
Information contact	:	1-800-441-9547 / 1-303-792-5554
In case of emergency	:	**1-800-424-9300 (Chemtrec)**

2. Hazards identification

Physical state	:	Liquid.
Odor	:	Aromatic.
OSHA/HCS status	:	This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Emergency overview	:	WARNING! FLAMMABLE LIQUID AND VAPOR. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. MAY BE HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT CAN CAUSE TARGET ORGAN DAMAGE. POSSIBLE CANCER HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE CANCER, BASED ON ANIMAL DATA. Flammable liquid. Harmful by inhalation and in contact with skin. May be harmful if swallowed. Irritating to eyes, respiratory system and skin. Keep away from heat, sparks and flame. Avoid exposure - obtain special instructions before use. Do not breathe vapor or mist. Do not ingest. Do not get in eyes or on skin or clothing. Contains material that can cause target organ damage. Contains material which may cause cancer, based on animal data. Risk of cancer depends on duration and level of exposure. Use only with adequate ventilation. Keep container tightly closed and sealed until ready for use. Wash thoroughly after handling.

Potential acute health effects

Eyes	:	Irritating to eyes.
Skin	:	Toxic in contact with skin. Irritating to skin.
Inhalation	:	Toxic by inhalation. Irritating to respiratory system. Exposure to decomposition products may cause a health hazard. Serious effects may be delayed following exposure.
Ingestion	:	Harmful if swallowed.
Medical conditions aggravated by over-exposure	:	Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (section 11)

3 . Composition/information on ingredients

Name	CAS number	%
xylene	1330-20-7	30 - 60
ethylbenzene	100-41-4	14.9 - 30
2-ethylhexyl nitrate	27247-96-7	4.99 - 9.99
2-butoxyethanol	111-76-2	0.99 - 4.99
solvent naphtha (petroleum), heavy arom.	64742-94-5	0.99 - 4.99
naphthalene	91-20-3	0.09 - 0.99

4 . First aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

Protection of first-aiders : No action shall be taken involving any personal risk or without suitable training. If it is suspected that fumes are still present, the rescuer should wear an appropriate mask or self-contained breathing apparatus. It may be dangerous to the person providing aid to give mouth-to-mouth resuscitation. Wash contaminated clothing thoroughly with water before removing it, or wear gloves.

5 . Fire-fighting measures

Flammability of the product : May be combustible at high temperature.

Products of combustion : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide
nitrogen oxides

Extinguishing media

Suitable : Use dry chemical, CO_2, water spray (fog) or foam.

Not suitable : Do not use water jet.

Special exposure hazards : Flammable liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard.

Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

Remarks : In a fire or if heated, a pressure increase will occur and the container may burst.Cool containing vessels with flooding quantities of water until well after fire is out.

6 . Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see section 8).

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

6 . Accidental release measures

Methods for cleaning up : Stop leak if without risk. Move containers from spill area. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see section 13). Use spark-proof tools and explosion-proof equipment. Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see section 1 for emergency contact information and section 13 for waste disposal.

7 . Handling and storage

Handling : Put on appropriate personal protective equipment (see section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Do not get in eyes or on skin or clothing. Do not breathe vapor or mist. Do not ingest. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

Storage Temperature: Ambient

8 . Exposure controls/personal protection

Product name	Exposure limits
xylene	**ACGIH TLV (United States, 1/2007).** TWA: 100 ppm, 0 times per shift, 8 hour(s). TWA: 434 mg/m³, 0 times per shift, 8 hour(s). STEL: 150 ppm, 0 times per shift, 15 minute(s). STEL: 651 mg/m³, 0 times per shift, 15 minute(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm, 0 times per shift, 8 hour(s). TWA: 435 mg/m³, 0 times per shift, 8 hour(s). STEL: 150 ppm, 0 times per shift, 15 minute(s). STEL: 655 mg/m³, 0 times per shift, 15 minute(s). **OSHA PEL (United States, 11/2006).** TWA: 100 ppm, 0 times per shift, 8 hour(s). TWA: 435 mg/m³, 0 times per shift, 8 hour(s).
ethylbenzene	**ACGIH TLV (United States, 1/2007).** TWA: 100 ppm, 0 times per shift, 8 hour(s). STEL: 125 ppm, 0 times per shift, 15 minute(s). **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm, 0 times per shift, 8 hour(s). TWA: 435 mg/m³, 0 times per shift, 8 hour(s). STEL: 125 ppm, 0 times per shift, 15 minute(s). STEL: 545 mg/m³, 0 times per shift, 15 minute(s). **NIOSH REL (United States, 12/2001).** TWA: 100 ppm, 0 times per shift, 10 hour(s). TWA: 435 mg/m³, 0 times per shift, 10 hour(s). STEL: 125 ppm, 0 times per shift, 15 minute(s). STEL: 545 mg/m³, 0 times per shift, 15 minute(s). **OSHA PEL (United States, 11/2006).**

8 . Exposure controls/personal protection

TWA: 100 ppm, 0 times per shift, 8 hour(s).
TWA: 435 mg/m³, 0 times per shift, 8 hour(s).

2-butoxyethanol

OSHA PEL 1989 (United States, 3/1989). Skin
TWA: 25 ppm, 0 times per shift, 8 hour(s).
TWA: 120 mg/m³, 0 times per shift, 8 hour(s).
NIOSH REL (United States, 12/2001). Skin
TWA: 5 ppm, 0 times per shift, 10 hour(s).
TWA: 24 mg/m³, 0 times per shift, 10 hour(s).
ACGIH TLV (United States, 1/2007).
TWA: 20 ppm, 0 times per shift, 8 hour(s).
OSHA PEL (United States, 11/2006). Skin
TWA: 50 ppm, 0 times per shift, 8 hour(s).
TWA: 240 mg/m³, 0 times per shift, 8 hour(s).

naphthalene

ACGIH TLV (United States, 1/2007).
TWA: 10 ppm, 0 times per shift, 8 hour(s).
TWA: 52 mg/m³, 0 times per shift, 8 hour(s).
STEL: 15 ppm, 0 times per shift, 15 minute(s).
STEL: 79 mg/m³, 0 times per shift, 15 minute(s).
OSHA PEL 1989 (United States, 3/1989).
TWA: 10 ppm, 0 times per shift, 8 hour(s).
TWA: 50 mg/m³, 0 times per shift, 8 hour(s).
STEL: 15 ppm, 0 times per shift, 15 minute(s).
STEL: 75 mg/m³, 0 times per shift, 15 minute(s).
NIOSH REL (United States, 12/2001).
TWA: 10 ppm, 0 times per shift, 10 hour(s).
TWA: 50 mg/m³, 0 times per shift, 10 hour(s).
STEL: 15 ppm, 0 times per shift, 15 minute(s).
STEL: 75 mg/m³, 0 times per shift, 15 minute(s).
OSHA PEL (United States, 11/2006).
TWA: 10 ppm, 0 times per shift, 8 hour(s).
TWA: 50 mg/m³, 0 times per shift, 8 hour(s).

Consult local authorities for acceptable exposure limits.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Personal protection

Eyes : Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists, gases or dusts.

Skin : Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product.

Respiratory : Use a properly fitted, air-purifying or air-fed respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

Hands : Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

9 . Physical and chemical properties

Physical state	: Liquid.
Flash point	: Closed cup: 30°C (86°F)
Auto-ignition temperature	: Lowest known value: 130 to 215°C (266 to 419°F) (2-ethylhexyl nitrate).
Flammable limits	: Greatest known range: Lower: 1.1% Upper: 10.6% (2-butoxyethanol)
Color	: Clear. Yellow.
Odor	: Aromatic.
Boiling/condensation point	: Lowest known value: 136.05°C (276.9°F) (ethylbenzene). Weighted average: 141.18°C (286.1°F)
Melting/freezing point	: May start to solidify at the following temperature: <-20°C (-4°F) This is based on data for the following ingredient: solvent naphtha (petroleum), heavy arom.. Weighted average: -42.77°C (-45°F)
Specific gravity	: 0.887 [ASTM D 4052]
Vapor pressure	: Highest known value: 0.7 to 0.9 kPa (5 to 6.6 mm Hg) (at 20°C) (xylene). Weighted average: 0.66 kPa (4.95 mm Hg) (at 20°C)
Vapor density	: Highest known value: 4.6 to 5.5 (Air = 1) (solvent naphtha (petroleum), heavy arom.). Weighted average: 3.52 (Air = 1)
Odor threshold	: Lowest known value: 0.001 to 0.03 ppm (2-ethylhexyl nitrate)
Evaporation rate	: Highest known value: <1 (2-ethylhexyl nitrate) Weighted average: 0.75compared with Butyl acetate.
Solubility	: Easily soluble in the following materials: cold water and hot water.

10 . Stability and reactivity

Stability and reactivity	: The product is stable. This preparation contains materials which are unstable under the following conditions:Heat.
Incompatibility with various substances	: Reactive or incompatible with the following materials: oxidizing materials, reducing materials and alkalis. Incompatible with fluorine.
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.
Hazardous polymerization	: Under normal conditions of storage and use, hazardous polymerization will not occur.
Conditions of reactivity	: Flammable in the presence of the following materials or conditions: open flames, sparks and static discharge. Slightly explosive in the presence of the following materials or conditions: heat.

11 . Toxicological information

Acute toxicity

Product/ingredient name	**Result**	**Species**	**Dose**	**Exposure**
ethylbenzene	LD50 Dermal	Rabbit	>5000 mg/kg	-
	LD50 Oral	Rat	3500 mg/kg	-
xylene	LD50 Dermal	Rabbit	4320 mg/kg	-
	LD50 Oral	Rat	4300 mg/kg	-
	LC50 Inhalation Vapor	Rat	6700 ppm	4 hours
2-butoxyethanol	LD50 Dermal	Rabbit	220 mg/kg	-
	LD50 Intraperitoneal	Rat	220 mg/kg	-
	LD50 Intravenous	Rat	307 mg/kg	-
	LD50 Oral	Rat	470 mg/kg	-
	LD50 Oral	Rat	917 mg/kg	-
	LD50 Oral	Rat	250 mg/kg	-
	LD50 Unreported	Rat	917 mg/kg	-
	LDLo Oral	Rat	1500 mg/kg	-
	TDLo Oral	Rat	500 mg/kg	-
	TDLo Unreported	Rat	250 mg/kg	-
2-ethylhexyl nitrate	LD50 Dermal	Rabbit	>4820 mg/kg	-
	LD50 Oral	Rat	>9640 mg/kg	-
	LDLo Oral	Rat	7500 mg/kg	-

11 . Toxicological information

	LC50 Inhalation Vapor	Rat	4.6 mg/L	1 hours
naphthalene	LD50 Dermal	Rat	>2500 mg/kg	-
	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	490 mg/kg	-
	LC50 Inhalation Vapor	Rat	>340 mg/m³	1 hours
solvent naphtha (petroleum), heavy arom.	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>2000 mg/kg	-

Conclusion/Summary : Not available.

Chronic toxicity

Conclusion/Summary : Not available.

Irritation/Corrosion

Conclusion/Summary : Not available.

Sensitizer

Conclusion/Summary : Not available.

Carcinogenicity

Conclusion/Summary : Not available.

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
xylene	A4	3	-	-	-	-
ethylbenzene	A3	2B	-	-	-	-
2-butoxyethanol	A3	3	-	-	-	-
naphthalene	A4	2B	-	-	Possible	-

Mutagenicity

Conclusion/Summary : Not available.

Teratogenicity

Conclusion/Summary : Not available.

Reproductive toxicity

Conclusion/Summary : Not available.

12 . Ecological information

Environmental effects : No known significant effects or critical hazards.

Aquatic ecotoxicity

Product/ingredient name	Test	Result	Species	Exposure
ethylbenzene	-	Acute EC50 7.2 mg/L	Algae - Selenastrum capricornutum	48 hours
	-	Acute EC50 2.93 mg/L	Daphnia - Daphnia magna	48 hours
	-	Acute LC50 4.2 mg/L	Fish - Oncorhynchus mykiss	96 hours
xylene	-	Acute LC50 3.3 mg/L	Fish - Oncorhynchus mykiss	96 hours
2-butoxyethanol	-	Acute LC50 1490 mg/L	Fish - Lepomis macrochirus	96 hours
	-	Acute LC50 1250000 ug/L Marine water	Fish - Inland silverside - Menidia beryllina	96 hours
	-	Acute LC50 800000 to 1000000 ug/L Marine water	Crustaceans - Common shrimp, sand shrimp - Crangon crangon	48 hours
	-	Acute LC50 1490000 ug/L Fresh water	Fish - Bluegill - Lepomis macrochirus	96 hours

12 . Ecological information

2-ethylhexyl nitrate	-	Acute EC50 >12.6 mg/L	Algae	72 hours
	-	Acute EC50 >12.6 mg/L	Daphnia	48 hours
	-	Acute LC50 >12.6 mg/L	Fish	96 hours
naphthalene	-	Acute EC50 1.96 mg/L Fresh water	Daphnia - Water flea - Daphnia magna	48 hours
	-	Acute LC50 1.8 mg/L	Fish - Oncorhynchus mykiss	96 hours
solvent naphtha (petroleum), heavy arom.	-	Acute EC50 3 to 10 mg/l	Daphnia	48 hours
	-	Acute EC50 1 to 3 mg/l	Algae	72 hours
	-	Acute LC50 2 to 5 mg/l	Fish	96 hours

Conclusion/Summary : Not available.

Biodegradability

Conclusion/Summary : Not available.

13 . Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Empty containers or liners may retain some product residues. This material and its container must be disposed of in a safe way. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

The information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14 . Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
DOT Classification	UN1307	Xylenes solution	3	III		**Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 60 L **Cargo aircraft** Quantity limitation: 220 L **Special provisions** B1, IB3, T2, TP1

This Material Safety Data Sheet conforms to the requirements of ANSI Z400.1.

Date of issue : **September 04, 2008**

14 . Transport information

TDG Classification	UN1307	XYLENES solution	3	III		**Explosive Limit and Limited Quantity Index** 5 **Passenger Carrying Road or Rail Index** 60
Mexico Classification	UN1307	XILENOS solution	3	III		**Special provisions** 223
ADR/RID Class	UN1307	XYLENES solution	3	III		**Hazard identification number** 30 **Limited quantity** LQ7 **CEFIC Tremcard** 30S1307-III
IMDG Class	UN1307	XYLENES solution	3	III		**Emergency schedules (EmS)** F-E, S-D
IATA-DGR Class	UN1307	Xylenes solution	3	III		**Passenger and Cargo Aircraft** Quantity limitation: 60 L Packaging instructions: 309 **Cargo Aircraft Only** Quantity limitation: 220 L Packaging instructions: 310 **Limited Quantities - Passenger Aircraft** Quantity limitation: 10 L Packaging instructions: Y309

PG* : Packing group

Reportable quantity : CERCLA: Hazardous substances.: vinyl acetate: 5000 lbs. (2270 kg); xylene: 100 lbs. (45.4 kg); ethylbenzene: 1000 lbs. (454 kg); naphthalene: 100 lbs. (45.4 kg); toluene: 1000 lbs. (454 kg); cumene: 5000 lbs. (2270 kg); 2-butoxyethanol;

Flash point : Closed cup: 30°C (86°F)

15 . Regulatory information

United States

HCS Classification : Flammable liquid
Toxic material
Irritating material
Carcinogen
Target organ effects

U.S. Federal regulations : TSCA 4(a) final test rules: naphthalene
TSCA 8(a) PAIR: naphthalene
United States inventory (TSCA 8b): All components are listed or exempted.
TSCA 12(b) one-time export: naphthalene

15 . Regulatory information

SARA 302/304/311/312 extremely hazardous substances: No products were found.
SARA 302/304 emergency planning and notification: No products were found.
SARA 302/304/311/312 hazardous chemicals: xylene; ethylbenzene; 2-butoxyethanol
SARA 311/312 MSDS distribution - chemical inventory - hazard identification: xylene: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard; ethylbenzene: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard; 2-butoxyethanol: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Water Act (CWA) 307: ethylbenzene; naphthalene; toluene

Clean Water Act (CWA) 311: vinyl acetate; xylene; ethylbenzene; naphthalene; toluene

Clean Air Act (CAA) 112 accidental release prevention: vinyl acetate

Clean Air Act (CAA) 112 regulated flammable substances: No products were found.

Clean Air Act (CAA) 112 regulated toxic substances: vinyl acetate

Not applicable

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements :	xylene	1330-20-7	30 - 60
	ethylbenzene	100-41-4	14.9 - 30
	2-butoxyethanol	111-76-2	0.99 - 4.99
	naphthalene	91-20-3	0.09 - 0.99
Supplier notification :	xylene	1330-20-7	30 - 60
	ethylbenzene	100-41-4	14.9 - 30
	2-butoxyethanol	111-76-2	0.99 - 4.99
	naphthalene	91-20-3	0.09 - 0.99

State regulations : **WARNING:** This product contains a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level
ethylbenzene	Yes.	No.	No.	No.
naphthalene	Yes.	No.	Yes.	No.
toluene	No.	Yes.	No.	7000 µg/day (ingestion) 13000 µg/day (inhalation)

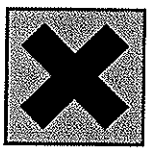
Canada

WHMIS (Canada) : Class B-2: Flammable liquid
Class D-1A: Material causing immediate and serious toxic effects (Very toxic).
Class D-2A: Material causing other toxic effects (Very toxic).
Class D-2B: Material causing other toxic effects (Toxic).

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all the information required by the CPR.

EU regulations

Hazard symbol or symbols :



Risk phrases : R10- Flammable.
R20/21- Harmful by inhalation and in contact with skin.
R38- Irritating to skin.
R52/53- Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety phrases : S36/37- Wear suitable protective clothing and gloves.

16 . Other information

Label requirements : FLAMMABLE LIQUID AND VAPOR. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. MAY BE HARMFUL IF SWALLOWED. CONTAINS MATERIAL THAT CAN CAUSE TARGET ORGAN DAMAGE. POSSIBLE CANCER HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE CANCER, BASED ON ANIMAL DATA.

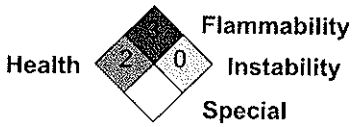
Hazardous Material Information System (U.S.A.) :

Health	*	2
Flammability		3
Physical hazards		0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on MSDSs under 29 CFR 1910.1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.) :



Date of printing : 05/09/2008.

Date of issue : 04/09/2008.

Date of previous issue : No previous validation.

Version : 1.02

Indicates information that has changed from previously issued version.

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

We create chemistry

Safety Data Sheet
Keropur® AP 205-20

1. Identification

Product identifier used on the label

Keropur® AP 205-20

Recommended use of the chemical and restriction on use
Recommended use*: Chemical
Suitable for use in industrial sector: Petroleum industry

* The “Recommended use” identified for this product is provided solely to comply with a US Federal requirement and is not part of the seller's published specification. The terms of this Safety Data Sheet (SDS) do not create or infer any warranty, express or implied, including by incorporation into or reference in the seller's sales agreement.

Details of the supplier of the safety data sheet

Company:
BASF CORPORATION
100 Park Avenue
Florham Park, NJ 07932, USA

Telephone: +1 973 245-6000

Emergency telephone number

CHEMTREC: 1-800-424-9300
BASF HOTLINE: 1-800-832-HELP (4357)

Other means of identification
Synonyms: POLYISOBUTYLAMINE, POLYETHER AND HYDROCARBON

2. Hazards Identification

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Classification of the product

Asp. Tox.	1	Aspiration hazard
Flam. Liq.	3	Flammable liquid
Skin Corr./Irrit.	2	Skin corrosion/irritation
Eye Dam./Irrit.	2B	Serious eye damage/eye irritation
Carc.	2	Carcinogenicity
STOT RE	2	Specific target organ toxicity — repeated exposure
Aquatic Acute	3	Hazardous to the aquatic environment - acute

Aquatic Chronic	3	Hazardous to the aquatic environment - chronic

Label elements

Pictogram:

Signal Word:
Danger

Hazard Statement:

H226	Flammable liquid and vapour.
H320	Causes eye irritation.
H315	Causes skin irritation.
H312	Harmful in contact with skin.
H332	Harmful if inhaled.
H304	May be fatal if swallowed and enters airways.
H351	Suspected of causing cancer.
H373	May cause damage to organs (Auditory organ) through prolonged or repeated exposure.
H402	Harmful to aquatic life.
H412	Harmful to aquatic life with long lasting effects.

Precautionary Statements (Prevention):

P280	Wear protective gloves/protective clothing/eye protection/face protection.
P271	Use only outdoors or in a well-ventilated area.
P201	Obtain special instructions before use.
P210	Keep away from heat/sparks/open flames/hot surfaces. – No smoking.
P273	Avoid release to the environment.
P260	Do not breathe dust/gas/mist/vapours.
P202	Do not handle until all safety precautions have been read and understood.
P243	Take precautionary measures against static discharge.
P241	Use explosion-proof electrical/ventilating/lighting/equipment.
P264	Wash with plenty of water and soap thoroughly after handling.
P233	Keep container tightly closed.
P240	Ground/bond container and receiving equipment.
P242	Use only non-sparking tools.

Precautionary Statements (Response):

P308 + P311	IF exposed or concerned: Call a POISON CENTER or doctor/physician.
P305 + P351 + P338	IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P304 + P340	IF INHALED: Remove person to fresh air and keep comfortable for breathing.
P301 + P310	IF SWALLOWED: Immediately call a POISON CENTER or doctor/physician.
P303 + P361 + P353	IF ON SKIN (or hair): Remove/Take off immediately all contaminated clothing. Rinse skin with water/shower.
P303 + P352	IF ON SKIN (or hair): Wash with plenty of soap and water.
P361	Remove/Take off immediately all contaminated clothing.
P332 + P313	If skin irritation occurs: Get medical advice/attention.
P331	Do NOT induce vomiting.
P337 + P311	If eye irritation persists: Call a POISON CENTER or doctor/physician.
P370 + P378	In case of fire: Use (...) for extinction.

Precautionary Statements (Storage):

P405	Store locked up.
P403 + P235	Store in a well-ventilated place. Keep cool.

Precautionary Statements (Disposal):

P501	Dispose of contents/container to hazardous or special waste collection point.

Hazards not otherwise classified

If applicable information is provided in this section on other hazards which do not result in classification but which may contribute to the overall hazards of the substance or mixture.

According to Regulation 1994 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

Emergency overview

DANGER:
IRRITANT.
TOXIC.
FLAMMABLE.
Skin and/or eye irritant
Contains an IARC Group 2B carcinogen - possibly carcinogenic to humans.
Contains a suspected reproductive toxin.
Contains petroleum distillates and prolonged contact with mists may cause skin, eye and respiratory tract irritation. Continued overexposure may cause headache and dizziness. Ingestion may cause lung complications.

3. Composition / Information on Ingredients

According to Regulation 2012 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

CAS Number	Content (W/W)	Chemical name
Trade Secret	>= 25.0 - < 50.0 %	Methylated homopolymer
64771-72-8	>= 15.0 - < 25.0 %	Paraffins (petroleum), normal C5-20
64742-48-9	>= 3.0 - < 7.0 %	Naphtha (petroleum), hydrotreated heavy
1330-20-7	>= 15.0 - < 20.0 %	Xylene
100-41-4	>= 3.0 - < 5.0 %	ethylbenzene

A subset of the components listed above have been tested as a mixture.

According to Regulation 1994 OSHA Hazard Communication Standard; 29 CFR Part 1910.1200

CAS Number	Content (W/W)	Chemical name
Trade Secret	>= 25.0 - <= 50.0 %	Methylated homopolymer
64771-72-8	>= 15.0 - <= 25.0 %	Paraffins (petroleum), normal C5-20
64742-48-9	>= 3.0 - <= 7.0 %	Naphtha (petroleum), hydrotreated heavy
1330-20-7	>= 15.0 - <= 20.0 %	Xylene
100-41-4	>= 3.0 - <= 5.0 %	ethylbenzene

4. First-Aid Measures

Description of first aid measures

General advice:
Immediately remove contaminated clothing.

If inhaled:
Remove the affected individual into fresh air and keep the person calm. Assist in breathing if necessary. Immediate medical attention required.

If on skin:
Wash affected areas thoroughly with soap and water. If irritation develops, seek medical attention.

If in eyes:
In case of contact with the eyes, rinse immediately for at least 15 minutes with plenty of water. If irritation develops, seek medical attention.

If swallowed:
Rinse mouth and then drink plenty of water. Do not induce vomiting due to aspiration hazard. Never induce vomiting or give anything by mouth if the victim is unconscious or having convulsions. Immediate medical attention required.

Most important symptoms and effects, both acute and delayed

Symptoms: The most important known symptoms and effects are described in the labelling (see section 2) and/or in section 11.
Further important symptoms and effects are so far not known.
Hazards: No applicable information available.

Indication of any immediate medical attention and special treatment needed

Note to physician
Treatment: Treat according to symptoms (decontamination, vital functions), no known specific antidote.

5. Fire-Fighting Measures

Extinguishing media

Suitable extinguishing media:
alcohol-resistant foam, dry powder

Unsuitable extinguishing media for safety reasons:
water

Special hazards arising from the substance or mixture
Hazards during fire-fighting:
harmful vapours
Evolution of fumes/fog. The substances/groups of substances mentioned can be released in case of fire.

Advice for fire-fighters
Protective equipment for fire-fighting:
Firefighters should be equipped with self-contained breathing apparatus and turn-out gear.

Further information:
Approach with extreme caution. Contain contaminated water/firefighting water.

6. Accidental release measures

Personal precautions, protective equipment and emergency procedures
Use breathing apparatus if exposed to vapours/dust/aerosol. Do not get in eyes, on skin, or on clothing. Take appropriate protective measures.

Environmental precautions
Notify proper authorities. Do not discharge into drains/surface waters/groundwater.
Substance/product is RCRA hazardous due to its properties.

Methods and material for containment and cleaning up
Spills should be contained, solidified, and placed in suitable containers for disposal.

7. Handling and Storage

Precautions for safe handling
Keep away from sources of ignition - No smoking. Handle and open container with care. Keep container tightly sealed.

Protection against fire and explosion:
Vapours may form ignitable mixture with air. Avoid all sources of ignition: heat, sparks, open flame. Avoid extreme heat. Empty containers may contain flammable residue. Substance/product is flammable.

Conditions for safe storage, including any incompatibilities
No applicable information available.

Further information on storage conditions: Keep container tightly closed. Avoid all sources of ignition: heat, sparks, open flame.

8. Exposure Controls/Personal Protection

Components with occupational exposure limits

ethylbenzene	OSHA PEL	PEL 100 ppm 435 mg/m3 ;
	ACGIH TLV	TWA value 100 ppm ; STEL value 125 ppm ; TWA value 20 ppm ;

Xylene	OSHA PEL	PEL 100 ppm 435 mg/m3 ;
	ACGIH TLV	TWA value 100 ppm ; STEL value 150 ppm ;

Advice on system design:
No applicable information available.

Personal protective equipment

Respiratory protection:
Wear a NIOSH-certified (or equivalent) organic vapour/particulate respirator. Do not exceed the maximum use concentration for the respirator facepiece/cartridge combination. For emergency or non-routine, high exposure situations, use a NIOSH-certified full facepiece pressure demand self-contained breathing apparatus (SCBA) or a full facepiece pressure demand supplied-air respirator (SAR) with escape provisions.

Hand protection:
Chemical resistant protective gloves, Rubber gloves, Plastic gloves

Eye protection:
Tightly fitting safety goggles (chemical goggles) and face shield.

General safety and hygiene measures:
Avoid prolonged and/or repeated contact with the skin. Avoid inhalation of vapour. Do not get in eyes, on skin, or on clothing. Avoid all routes of exposure including ingestion, skin absorption and inhalation. Keep away from food, drink and animal feeding stuffs. Take off immediately all contaminated clothing. Handle in accordance with good industrial hygiene and safety practice.

9. Physical and Chemical Properties

Form:	liquid	
Odour:	mild, amine-like	
Odour threshold:		No applicable information available.
Colour:	clear to slightly amber	
pH value:	9.5 - 10.7	(1 %(m))
Freezing point:	-42 - -30 °C	
Boiling point:	148 - 198 °C	(1,013 hPa)
Sublimation point:		No applicable information available.
Flash point:	approx. 38 °C	(closed cup)
Flammability:	Flammable.	
Lower explosion limit:		For liquids not relevant for classification and labelling. The lower explosion point may be 5 - 15 °C below the flash point.
Upper explosion limit:		For liquids not relevant for classification and labelling.
Autoignition:		not determined
Information on: Xylene		
Autoignition:	approx. 488 °C	Literature data.

Vapour pressure:	< 5 mmHg	(20 °C)
Density:	0.8676 g/cm3	(15 °C)
Relative density:	0.84 - 0.88	(15 °C)
Vapour density:		No applicable information available.
Partitioning coefficient n-octanol/water (log Pow):		Study scientifically not justified.
Self-ignition temperature:		not self-igniting

Thermal decomposition:	No decomposition if correctly stored and handled.
Viscosity, dynamic:	not determined
Viscosity, kinematic:	No applicable information available.
Solubility in water:	insoluble
Solubility (quantitative):	No applicable information available.
Solubility (qualitative):	No applicable information available.
Evaporation rate:	Value can be approximated from Henry's Law Constant or vapor pressure.
Other Information:	If necessary, information on other physical and chemical parameters is indicated in this section.

10. Stability and Reactivity

Reactivity
No applicable information available.

Corrosion to metals:
No corrosive effect on metal.

Oxidizing properties:
not fire-propagating

Chemical stability
The product is stable if stored and handled as prescribed/indicated.

Possibility of hazardous reactions
No hazardous reactions when stored and handled according to instructions.
The product is chemically stable.

Conditions to avoid
Avoid all sources of ignition: heat, sparks, open flame. Avoid electro-static discharge.

Incompatible materials
strong acids, strong bases, strong oxidizing agents

Hazardous decomposition products

Decomposition products:
Hazardous decomposition products: No hazardous decomposition products if stored and handled as prescribed/indicated.

Thermal decomposition:
No decomposition if correctly stored and handled.

11. Toxicological information

Primary routes of exposure

Routes of entry for solids and liquids are ingestion and inhalation, but may include eye or skin contact. Routes of entry for gases include inhalation and eye contact. Skin contact may be a route of entry for liquefied gases.

Acute Toxicity/Effects

Acute toxicity
Assessment of acute toxicity: Virtually nontoxic after a single ingestion.

Oral
Type of value: LD50
Species: rat
Value: > 2,000 mg/kg

Inhalation
Type of value: ATE
Value: > 20.0000 mg/l
Determined for vapor

Type of value: ATE
Value: > 5.0000 mg/l
Determined for mist

Dermal
Type of value: ATE
Value: > 5,000 mg/kg

Assessment other acute effects
No applicable information available.

Irritation / corrosion
Assessment of irritating effects: Irritating to eyes and skin.

Skin
Species: rabbit
Result: Irritant.

Sensitization
Assessment of sensitization: No applicable information available.

Aspiration Hazard
May also damage the lung at swallowing (aspiration hazard).

Chronic Toxicity/Effects

Repeated dose toxicity
Assessment of repeated dose toxicity: The substance may cause damage to the peripheral nervous system after repeated ingestion of high doses.

Genetic toxicity
Assessment of mutagenicity: No applicable information available.

Carcinogenicity
Assessment of carcinogenicity: Contains a compound classified as IARC Group 2B (possibly carcinogenic to humans).

Information on: ethylbenzene
Assessment of carcinogenicity: Indication of possible carcinogenic effect in animal tests. The effect is caused by an animal specific mechanism that has no human counter part. A clear indication of an increased risk of cancer in humans has so far not been shown. IARC (International Agency for Research on Cancer) has classified this substance as group 2B (The agent is possibly carcinogenic to humans).
IARC (International Agency for Research on Cancer) has classified this substance as group 2B (The agent is possibly carcinogenic to humans). NTP listed carcinogen
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Reproductive toxicity
Assessment of reproduction toxicity: No applicable information available.

Other Information
The product has not been tested. The statements on toxicology have been derived from the properties of the individual components.

Symptoms of Exposure

The most important known symptoms and effects are described in the labelling (see section 2) and/or in section 11.
Further important symptoms and effects are so far not known.

Medical conditions aggravated by overexposure
Data available do not indicate that there are medical conditions that are generally recognized as being aggravated by exposure to this substance/product. See MSDS section 11 - Toxicological information.

12. Ecological Information

Toxicity

Aquatic toxicity
Assessment of aquatic toxicity:
Harmful to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Toxicity to fish
LC50 (96 h) 10 - 100 mg/l, Brachydanio rerio

Microorganisms/Effect on activated sludge

Toxicity to microorganisms
bacterium/EC10 (0.5 h): 1,400 mg/l
Inhibition of degradation activity in activated sludge is not to be anticipated during correct introduction of low concentrations.

Persistence and degradability

Assessment biodegradation and elimination (H2O)
The product is not very soluble in water and can thus be removed from water mechanically in suitable effluent treatment plants.

Bioaccumulative potential

Bioaccumulation potential
No data available.

Mobility in soil

Assessment transport between environmental compartments
No data available.

Additional information

Other ecotoxicological advice:

The product has not been tested. The statements on ecotoxicology have been derived from the properties of the individual components.

13. Disposal considerations

Waste disposal of substance:
Dispose of in accordance with national, state and local regulations.

Container disposal:
Empty containers with less than 1 inch of residue may be landfilled at a licensed facility. Recommend crushing, puncturing or other means to prevent unauthorized use of used containers. If containers are not empty, they must be disposed of in a RCRA-licensed facility.
WARNING: Empty containers may still contain hazardous residue.

RCRA: D001

14. Transport Information

Land transport
USDOT

Hazard class:	3
Packing group:	III
ID number:	UN 1307
Hazard label:	3
Proper shipping name:	XYLENES SOLUTION

Sea transport
IMDG

Hazard class:	3
Packing group:	III
ID number:	UN 1307
Hazard label:	3
Marine pollutant:	NO
Proper shipping name:	XYLENES SOLUTION

Air transport
IATA/ICAO

Hazard class:	3
Packing group:	III
ID number:	UN 1307
Hazard label:	3
Proper shipping name:	XYLENES SOLUTION

15. Regulatory Information

Federal Regulations

Registration status:
Chemical TSCA, US released / listed

EPCRA 311/312 (Hazard categories): Acute; Chronic; Fire

EPCRA 313:

CAS Number	Chemical name
1330-20-7	Xylene
100-41-4	ethylbenzene

CERCLA RQ	CAS Number	Chemical name
1000 LBS	100-41-4	ethylbenzene
100 LBS	1330-20-7	Xylene

Reportable Quantity for release: 45 kg

State regulations

State RTK	CAS Number	Chemical name
MA, NJ, PA	1330-20-7	Xylene
MA, NJ, PA	100-41-4	ethylbenzene

CA Prop. 65:
WARNING: THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

NFPA Hazard codes:
Health : 2 Fire: 2 Reactivity: 0 Special:

HMIS III rating
Health: 2¤ Flammability: 2 Physical hazard: 0

16. Other Information

SDS Prepared by:
BASF NA Product Regulations
SDS Prepared on: 2014/09/08

We support worldwide Responsible Care® initiatives. We value the health and safety of our employees, customers, suppliers and neighbors, and the protection of the environment. Our commitment to Responsible Care is integral to conducting our business and operating our facilities in a safe and environmentally responsible fashion, supporting our customers and suppliers in ensuring the safe and environmentally sound handling of our products, and minimizing the impact of our operations on society and the environment during production, storage, transport, use and disposal of our products.

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END OF DATA SHEET

Safety Data Sheet

HiTEC 6590 Fuel Additive

MSDS no. H6590

HiTEC is a trademark owned by Afton Chemical Corporation or one of its subsidiaries.

1. Product and company identification

Date of issue/Revisions **6 April 2011**

In case of emergency - Chemical

+1-800-403-0044 (US & Canada)
+1-804-648-7727 (International)
+32-2-507-20-64 (Europe)
+81 345 789 341 (Japan)
+65 3158-1074 (Asia Pacific)
+86 10 5100 3039 (China)
+61 2801 44558 (Australia)

Manufacturer / Supplier

Afton Chemical Corporation
500 Spring St.
Richmond, VA 23219
Telephone number: +1-804-788-5800

Afton Chemical Limited
Euro-Tech Centre
London Road, Bracknell, Berkshire
RG12 2UW, England
Telephone Number: +44 1344 304141
msds@aftonchemical.com

In Singapore:
Afton Chemical Asia Pte. Ltd.
111 Somerset Road
#09-05
TripleOne Somerset
Singapore 238164
Telephone number: +65 3732 0822
Fax: +65 3737 4123

2. HAZARDS IDENTIFICATION

Notice to reader

Afton operates a world-wide system for hazard communication. Some hazards shown in Section 2 may apply to non-EU countries and may not result in classification and labeling in the EU. Please see Sections 3 and 15 for country specific classification information, and Section 11 for additional details.

Europe: The product is classified as dangerous according to Directive 1999/45/EC and its amendments.

Australia: HAZARDOUS SUBSTANCE. DANGEROUS GOODS.

Primary hazards and critical effects : Warning.
CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION.
ASPIRATION HAZARD IF SWALLOWED.

Physical/chemical hazards : COMBUSTIBLE. - United States and Canada
FLAMMABLE. - European Union
VAPOR MAY CAUSE FLASH FIRE.

Environmental hazards : Toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment.

Hazardous Material Information System (U.S.A.)

Health	**1**
Fire hazard	**2**
Reactivity	**0**

3. Composition/information on ingredients

Note: see section 8 for occupational exposure limits and section 11 for LC50/LD50 information

Substance/Preparation : Preparation

Ingredient name	CAS no.	Conc. (% w/w)	EU Classification	WHMIS Regulated?

Solvent naphtha (petroleum), light aromatic	64742-95-6	30 - 60	R10 Xn; R65 Xi; R37 R66, R67 N; R51/53	Yes.
Polyolefin alkyl phenol alkyl amine	Proprietary	30 - 60	Xi; R36/38	Yes.
Benzene, 1,2,4-trimethyl-	95-63-6	20 - 30	R10 Xn; R20 Xi; R36/37/38 N; R51/53	Yes.
Benzene, 1,3,5-trimethyl-	108-67-8	5 - 9.9	R10 Xi; R37 N; R51/53	Yes.
N-Propylbenzene	103-65-1	5 - 9.9	R10 Xn; R65 Xi; R37 N; R51/53	Yes.
Xylene	1330-20-7	1 - 4.9	R10 Xn; R20/21 Xi; R38	Yes.
Cumene	98-82-8	1 - 4.9	R10 Xn; R65 Xi; R37 N; R51/53	Yes.
2-Ethyl hexanol	104-76-7	1 - 4.9	Xi; R36/38	Yes.
Benzene, 1,2,3-trimethyl-	526-73-8	1 - 4.9	R10	Yes.
Solvent naphtha (petroleum), heavy aromatic	64742-94-5	0.5 - 0.99	Xn; R65 R66, R67 N; R51/53	Yes.

4. First aid measures

Inhalation : If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.

Ingestion : DO NOT induce vomiting. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. If affected person is fully conscious, give one glass of water to drink. Never give anything by mouth to an unconscious person. Get immediate medical attention.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately.

Eye contact : In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention immediately.

5. Fire-fighting measures

Extinguishing media : In case of fire, use water spray (fog), foam, dry chemical or CO_2.

Fire-fighting procedures : Fire-fighters should wear positive pressure self-contained breathing apparatus (SCBA) and full turnout gear.

Fire/explosion hazards : COMBUSTIBLE. - United States and Canada FLAMMABLE. - European Union

VAPOR MAY CAUSE FLASH FIRE. Vapors may accumulate in low or confined areas or travel a considerable distance to a source of ignition and flash back. Runoff to sewer may create fire or explosion hazard.

Hazardous decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Flash point : Closed cup: 44°C (111.2°F) [Pensky-Martens. Minimum]

6. Accidental release measures

Personal precautions : Immediately contact emergency personnel. Eliminate all ignition sources. Keep unnecessary personnel away. Use suitable protective equipment (section 8). Follow all fire-fighting procedures (section 5). Do not touch or walk through spilled material.

Environmental precautions and clean-up methods : If emergency personnel are unavailable, contain spilled material. For small spills, add absorbent (soil may be used in the absence of other suitable materials) and use a non-sparking or explosion-proof means to transfer material to a sealable, appropriate container for disposal. For large spills, dike spilled material or otherwise contain material to ensure runoff does not reach a waterway. Place spilled material in an appropriate container for disposal. Avoid contact of spilled material with soil and prevent runoff entering surface waterways.

Note: see section 1 for emergency contact information and section 13 for waste disposal.

7. Handling and storage

Handling : Avoid contact with eyes, skin and clothing. Keep container closed. Use only with adequate ventilation. Avoid breathing vapor or mist. Keep away from heat, sparks and flame. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Wash thoroughly after handling.

Storage : Keep container in a well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame).

8. Exposure controls/personal protection

Engineering controls : Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value.

Personal protective equipment

Respiratory system : Use appropriate respiratory protection if there is the potential to exceed the exposure limit(s).

Skin and body : Where contact is likely, wear chemical resistant gloves, a chemical resistant suit, and boots. Additional body garments should be used based upon the task being performed.

Hands : Hand Protection: Wear chemical resistant gloves. Nitrile gloves of minimum thickness 0.4 mm have an expected breakthrough time of 30 minutes or less when in frequent contact with the product. Due to variable exposure conditions the user must consider that the practical use of a chemical-protective glove in practice may be much shorter than the permeation time above. Manufacturer's directions for use, especially about the minimum thickness and the minimum breakthrough time, must be observed. This information does not replace suitability tests by the end user since glove protection varies depending on the conditions under which the product is used.

Eyes : Safety goggles are considered minimum protection. Goggles with a face shield may be necessary depending on quantity of material and conditions of use.

Occupational exposure limits

Ingredient name	OEL United States	OEL Canada	OEL Europe	OEL Australia
1) Benzene, 1,2,4-trimethyl-	**ACGIH (United States, 1999).** TWA: 25 ppm	(Canada). TWA: 25 ppm	**EH40 (UK) (Europe).** TWA: 25 ppm	**ACGIH (United States, 1999).** TWA: 25 ppm
2) Benzene, 1,3,5-trimethyl-	**ACGIH (United States, 1999).** TWA: 25 ppm	(Canada). TWA: 25 ppm	**EH40 (UK) (Europe).** TWA: 25 ppm	**ACGIH (United States, 1999).** TWA: 25 ppm
3) Xylene	**ACGIH (United States, 1996).** TWA: 100 ppm STEL: 150 ppm **OSHA (United States).** TWA: 100 ppm	(Canada). TWA: 100 STEL: 150	**EH40 (UK) (Europe, 2002). Absorbed through skin.** TWA: 50 ppm 8 hour(s). STEL: 100 ppm 15 minute(s).	**NOHSC (Australia, 2003).** STEL: 80 ppm 15 minute(s).
4) Cumene	**ACGIH (United States, 1994). Absorbed through skin.** TWA: 50 ppm **OSHA (United States, 1989). Absorbed through skin.** TWA: 50 ppm	(Canada). Absorbed through skin. TWA: 50 ppm	**EH40 (UK) (Europe). Absorbed through skin.** TWA: 25 ppm 8 hour(s). **EH40 (UK) (Europe, 2002). Absorbed through skin.** TWA: 125 mg/m³ 8 hour(s). STEL: 250 mg/m³ 15 minute(s).	**NOHSC (Australia, 2003). Absorbed through skin.** TWA: 25 ppm 8 hour(s). STEL: 75 ppm 15 minute(s).
5) Benzene, 1,2,3-trimethyl-	**ACGIH (United States, 1999).** TWA: 25 ppm	(Canada). TWA: 25 ppm	**ACGIH (United States, 1999).** TWA: 25 ppm	**ACGIH (United States, 1999).** TWA: 25 ppm

9. Physical and chemical properties

Physical state and Appearance : Liquid.

Density : Not determined.

Viscosity : 12.27 cSt at 40°C

Auto-ignition temperature : Not determined.

Flash point : Closed cup: 44°C (111.2°F) [Pensky-Martens. Minimum]

10. Stability and reactivity

Stability : The product is stable.

Materials to avoid : Strong oxidizing and reducing agents.

Conditions to avoid : High temperatures, sparks, and open flames.

11. Toxicological information

Routes of entry : Skin, Eyes, Ingestion, and Inhalation.

Target organs : Contains material which may cause damage to the following organs: blood, kidneys, lungs, liver, heart, gastrointestinal tract, upper respiratory tract, immune system, skin, eyes, central nervous system (CNS).

Acute effects

Inhalation : Irritating to respiratory system.

Ingestion : Aspiration hazard if swallowed. Can enter lungs and cause damage. Does not meet EU R65 classification criteria.

Ingestion may cause gastrointestinal irritation and diarrhea.

Skin contact : Irritating to skin.

Eye contact : Irritating to eyes.

Adverse effects : - Adverse symptoms may include the following:: In the presence of slight maternal toxicity, fetotoxic effects have been observed in the offspring of rats exposed by inhalation to Solvent Naphtha (petroleum) light aromatic.
- Adverse symptoms may include the following:: This product contains trimethylbenzene. Literature data indicate that long-term inhalation exposure causes blood effects in laboratory animals.
- Adverse symptoms may include the following:: Central nervous system, liver, kidneys, and blood effects by inhalation and heart beat irregularity (arrythmia) and heart beat - increase. High exposures to xylene in some animal studies, often at levels toxic to the mother, affected embryo/fetal development. The significance of this finding to humans is not known. Xylene vapour has caused occupational skin sensitization in humans. When exposed to 1800 ppm Xylene vapor, rats experienced hearing deficits to mid-frequency range tones.
- Adverse symptoms may include the following:: liver, kidneys, lungs, and heart effects by dermal route and immune system effects by ingestion route. Not a developmental toxicant when administered dermally. Weak carcinogenic liver response was observed in mice, but not rats.

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA	EU
Xylene	A4	-	-	-	-	-	-

Toxicity data

Product/ingredient name	Result	Species	Dose	Exposure
Solvent naphtha (petroleum), light aromatic	LD50 Oral	Rat	8400 mg/kg	-
	LD50 Oral	Rat	5000 mg/kg	-
	LD50 Oral	Rat	2900 mg/kg	-
Benzene, 1,2,4-trimethyl-	LD50 Dermal	Rabbit	3160 mg/kg	-
	LD50 Oral	Rat	5000 mg/kg	-
	LD50 Oral	Rat	3400 to 6000 mg/kg	-
	LC50 Inhalation Vapor	Rat	18000 mg/m³	4 hours
Polyether polyol	LD50 Dermal	Rabbit	>2000 mg/kg	-
	LD50 Oral	Rat	>5000 mg/kg	-
Benzene, 1,3,5-trimethyl-	LC50 Inhalation Vapor	Rat	24000 mg/m³	4 hours
N-Propylbenzene	LD50 Oral	Rat	6040 mg/kg	-
Xylene	LD50 Dermal	Rabbit	>14100 mg/kg	-
	LD50 Oral	Rat	4300 mg/kg	-
	LD50 Oral	Rat - Male	3523 mg/kg	-
	LC50 Inhalation Vapor	Rat	5000 to 8500 ppm	4 hours
Cumene	LD50 Dermal	Rabbit	10578 mg/kg	-
	LD50 Oral	Mouse	12750 mg/kg	-
	LD50 Oral	Rat	1400 mg/kg	-
	LC50 Inhalation Vapor	Rat	8000 ppm	4 hours
2-Ethyl hexanol	LD50 Dermal	Rabbit	1970 mg/kg	-
	LD50 Dermal	Rabbit	1700 mg/kg	-
	LD50 Oral	Rat	2000 to 5000 mg/kg	-
	LD50 Oral	Mouse	2000 to 3800 mg/kg	-

LC50 Inhalation Vapor	Rat	>227 ppm	6 hours

12. Ecological information

Environmental hazards : Toxic to aquatic organisms. May cause long-term adverse effects in the aquatic environment. Based on calculation.

Environmental fate : This product contains components which may be persistent in the environment.

13. Disposal considerations

Waste handling and disposal : Waste must be disposed of in accordance with federal, state and local environmental control regulations.

14. Transport information

Regulatory information	UN number	Proper shipping name	Class	Packing group	Label	Additional information
DOT Classification	NA1993	Combustible liquids, n.o.s. (Xylene, Petroleum distillates)	Combustible liquid.	III		-
TDG Classification	UN1993	Flammable liquid, n.o.s. (Xylene, Petroleum distillates)	3	III		-
ADR/RID Class	UN1993	Flammable liquid, n.o.s. (Xylene, Petroleum distillates)	3	III		**Hazard identification number** 30 **Special provisions** 640 (E) **Tunnel code** (D/E)
IMDG Class	UN1993	Flammable liquid, n.o.s. (Xylene, Petroleum distillates)	3	III		- Marine pollutant
IATA-DGR Class	UN1993	Flammable liquid, n.o.s. (Xylene, Petroleum distillates)	3	III		-
ADG Class	UN1993	Flammable liquid, n.o.s. (Xylene, Petroleum distillates)	3	III		-

Notice to reader

The above transport information is provided to assist in the proper classification of this product and may not be suitable for all shipping conditions.

15. Regulatory information

EU regulations

Hazard symbol(s) :

Irritant, Dangerous for the environment

Risk phrases : R10- Flammable.
R67- Vapors may cause drowsiness and dizziness.
R36/37/38- Irritating to eyes, respiratory system and skin.
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety phrases : S16- Keep away from sources of ignition - No smoking.
S23- Do not breathe vapor.
S36/37/39- Wear suitable protective clothing, gloves and eye/face protection.
S57- Use appropriate containment to avoid environmental contamination.

US regulations

SARA 313 toxic chemical notification and release reporting (w/w%)	Benzene, 1,2,4-trimethyl- Xylene Cumene	20 - 30 1 - 4.9 1 - 4.9

SARA 311/312 Hazardous Categorization : **SARA 311/312 MSDS distribution - chemical inventory - hazard identification**: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard

RQ (Reportable quantity) : CERCLA: Hazardous substances.: Xylene: 100 lbs. (45.4 kg); CUMENE: 5000 lbs. (2270 kg); Ethylbenzene: 1000 lbs. (454 kg); Naphthalene: 100 lbs. (45.4 kg); STYRENE: 1000 lbs. (454 kg); Toluene: 1000 lbs. (454 kg); Benzene: 10 lbs. (4.54 kg); P-XYLENE: 100 lbs. (45.4 kg); Acetaldehyde: 1000 lbs. (454 kg); FURAN: 100 lbs. (45.4 kg); Propylene oxide: 100 lbs. (45.4 kg); o-XYLENE: 1000 lbs. (454 kg); MALEIC ANHYDRIDE: 5000 lbs. (2270 kg);

State - California Prop. 65 : This product contains the following ingredients for which the State of California has found to cause cancer, birth defects or other reproductive harm, which would require a warning under the statute:
Cumene
Ethylbenzene
Naphthalene
Toluene
Benzene
Furan
Propylene oxide
Acetaldehyde

EPA Significant New Use Rule (SNUR)	Polyolefin alkyl phenol alkyl amine	United States - TSCA 5(a)2 - Proposed significant new use rules
EPA Consent Order	Polyolefin alkyl phenol alkyl amine	United States - TSCA 5(e) - Substances consent order

Canadian regulations

WHMIS (Classification) : Class B-3: Combustible liquid with a flash point between 37.8°C (100°F) and 93.3°C (200°F).
Class D-2B: Material causing other toxic effects (Toxic).

International Inventory Status

United States inventory (TSCA 8b)	All components are listed or exempted.
Canada inventory	All components are listed or exempted.
Europe inventory	All components are listed or exempted.
Japan inventory (ENCS)	All components are listed or exempted.
Australia inventory (AICS)	All components are listed or exempted.
Korea inventory (KECI)	All components are listed or exempted.
China inventory (IECSC)	All components are listed or exempted.
Philippines inventory (PICCS)	All components are listed or exempted.

16. Other information

PREPARATION INFORMATION

Validated by HS&E Department (Tel: +1 804 788 5800) on 4/6/2011.

Date of printing : **4/7/2011.**

Indicates information that has changed from previously issued version.

Notice to reader

This information and these recommendations are offered in good faith and believed to be correct as of the date hereof. Information and recommendations are supplied upon the condition that the recipients will make their own decision as to safety and suitability for their purposes. No representations or warranties, either expressed or implied, of merchantability, fitness for a particular purpose, or of any other nature, are made with respect to the product or the information and recommendations. Afton makes no representation as to completeness or accuracy. In no event will Afton be responsible for damages of any nature whatsoever resulting from the use or reliance upon the information and recommendations.

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Full text of R-phrases appearing in section 3: **:** R10- Flammable.
R20- Harmful by inhalation.
R20/21- Harmful by inhalation and in contact with skin.
R65- Harmful: may cause lung damage if swallowed.
R37- Irritating to respiratory system.
R38- Irritating to skin.
R36/38- Irritating to eyes and skin.
R36/37/38- Irritating to eyes, respiratory system and skin.
R66- Repeated exposure may cause skin dryness or cracking.
R67- Vapors may cause drowsiness and dizziness.
R51/53- Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

*** * * END OF MSDS * * ***

OLI-9103.x
Material Safety Data Sheet

1. Product and company identification

Product name	:	OLI-9103.x
Material uses	:	Petrochemical industry: Fuel additive.
Internal code	:	Not available.
Supplier	:	Innospec Fuel Specialties LLC 8310 South Valley Highway Suite 350 Englewood CO, 80112 USA
Information contact	:	1-800-441-9547
e-mail address of person responsible for this SDS	:	sdsinfo@innospecinc.com
Emergency telephone number		

In USA, Canada and North America, 24 hour / 7 day emergency response for our product is provided by the CHEMTREC (R) Emergency Call Center based in the USA

Country information	:	Emergency telephone number
USA	:	800 424 9300
Canada, Puerto Rico, Virgin Islands	:	+1 800 424 9300
In case of difficulties, or for ships at sea	:	+1 703 527 3887

In Europe, Middle East, Africa, Asia Pacific and South America 24 hour / 7 day emergency response for our products is provided by the NCEC CARECHEM 24 global network

The main regional centres are listed here in Section 1.
Other local contact numbers for specific language support in Asia Pacific are listed in Section 16

Country information	:	**Emergency telephone number**	**Location**
Europe (all countries, all languages)	:	+44 (0) 1235 239 670	London, UK
Middle East, Africa (Arabic, French, English)	:	+44 (0) 1235 239 671	Lebanon
Middle East, Africa (French, Portuguese, English)	:	+44 (0) 1235 239 670	London UK
Asia Pacific (all countries except China)	:	+65 3158 1074	Singapore
China	:	+86 10 5100 3039	Beijing China
South America (all countries except Brazil and Mexico)	:	+1 215 207 0061	Philadelphia USA
Brazil	:	+55 113 711 9144	Brazil
Mexico	:	+52 555 004 8763	Mexico

This Material Safety Data Sheet conforms to the requirements of ANSI Z400.1.

2. Hazards identification

Physical state	: Liquid.
Odor	: Aromatic.
OSHA/HCS status	: This material is considered hazardous by the OSHA Hazard Communication Standard (29 CFR 1910.1200).
Emergency overview	: WARNING! FLAMMABLE LIQUID AND VAPOR. CAUSES RESPIRATORY TRACT, EYE AND SKIN IRRITATION. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CONTAINS MATERIAL THAT CAN CAUSE TARGET ORGAN DAMAGE. POSSIBLE CANCER HAZARD - CONTAINS MATERIAL WHICH MAY CAUSE CANCER, BASED ON ANIMAL DATA.
Routes of entry	: Dermal contact. Eye contact. Inhalation. Ingestion.
Target organs	: Contains material which causes damage to the following organs: upper respiratory tract, skin, central nervous system (CNS), eye, lens or cornea. Contains material which may cause damage to the following organs: blood, kidneys, the nervous system, liver, gastrointestinal tract, ears.

Over-exposure signs/symptoms

Inhalation	: Adverse symptoms may include the following: respiratory tract irritation coughing
Ingestion	: No specific data.
Skin	: Adverse symptoms may include the following: irritation redness
Eyes	: Adverse symptoms may include the following: pain or irritation watering redness
Medical conditions aggravated by over-exposure	: Pre-existing disorders involving any target organs mentioned in this MSDS as being at risk may be aggravated by over-exposure to this product.

See toxicological information (Section 11)

3. Composition/information on ingredients

Name	CAS number	%
xylene	1330-20-7	15 - 30
ethylbenzene	100-41-4	4.99 - 9.99
Benzene, ethylenated, residues, distn. lights	178535-25-6	0.99 - 4.99
Solvent naphtha (petroleum), heavy arom.	64742-94-5	0.99 - 4.99
kerosene (petroleum)	8008-20-6	0.99 - 4.99
triethylbenzene	102-25-0	0.99 - 4.99
naphthalene	91-20-3	0.09 - 0.99

There are no additional ingredients present which, within the current knowledge of the supplier and in the concentrations applicable, are classified as hazardous to health or the environment and hence require reporting in this section.

4. First aid measures

Eye contact : Check for and remove any contact lenses. Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical attention immediately.

Skin contact : In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Clean shoes thoroughly before reuse. Get medical attention immediately.

Inhalation : Move exposed person to fresh air. If not breathing, if breathing is irregular or if respiratory arrest occurs, provide artificial respiration or oxygen by trained personnel. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Ingestion : Wash out mouth with water. Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention immediately.

5. Fire-fighting measures

Flammability of the product : Flammable liquid. In a fire or if heated, a pressure increase will occur and the container may burst, with the risk of a subsequent explosion. Runoff to sewer may create fire or explosion hazard.

Extinguishing media

Suitable : Use dry chemical, CO_2, water spray (fog) or foam.

Not suitable : Do not use water jet.

In case of fire : Promptly isolate the scene by removing all persons from the vicinity of the incident if there is a fire. No action shall be taken involving any personal risk or without suitable training. Move containers from fire area if this can be done without risk. Use water spray to keep fire-exposed containers cool.

Flash point : Closed cup: 34.444°C (94°F) [Pensky-Martens.]

Auto-ignition temperature : Lowest known value: 228.85°C (443.9°F) (kerosene (petroleum)).

Upper/lower flammability or explosive limits : Greatest known range: Lower: 0.6% Upper: 7% (Solvent naphtha (petroleum), heavy arom.)

Hazardous thermal decomposition products : Decomposition products may include the following materials:
carbon dioxide
carbon monoxide

Special protective equipment for fire-fighters : Fire-fighters should wear appropriate protective equipment and self-contained breathing apparatus (SCBA) with a full face-piece operated in positive pressure mode.

6. Accidental release measures

Personal precautions : No action shall be taken involving any personal risk or without suitable training. Evacuate surrounding areas. Keep unnecessary and unprotected personnel from entering. Do not touch or walk through spilled material. Shut off all ignition sources. No flares, smoking or flames in hazard area. Avoid breathing vapor or mist. Provide adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Put on appropriate personal protective equipment (see Section 8).

Environmental precautions : Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers. Inform the relevant authorities if the product has caused environmental pollution (sewers, waterways, soil or air).

Methods for cleaning up

Small spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Dilute with water and mop up if water-soluble. Alternatively, or if water-insoluble, absorb with an inert dry material and place in an appropriate waste disposal container. Dispose of via a licensed waste disposal contractor.

6. Accidental release measures

Large spill : Stop leak if without risk. Move containers from spill area. Use spark-proof tools and explosion-proof equipment. Approach release from upwind. Prevent entry into sewers, water courses, basements or confined areas. Wash spillages into an effluent treatment plant or proceed as follows. Contain and collect spillage with non-combustible, absorbent material e.g. sand, earth, vermiculite or diatomaceous earth and place in container for disposal according to local regulations (see Section 13). Dispose of via a licensed waste disposal contractor. Contaminated absorbent material may pose the same hazard as the spilled product. Note: see Section 1 for emergency contact information and Section 13 for waste disposal.

7. Handling and storage

Handling : Put on appropriate personal protective equipment (see Section 8). Eating, drinking and smoking should be prohibited in areas where this material is handled, stored and processed. Workers should wash hands and face before eating, drinking and smoking. Remove contaminated clothing and protective equipment before entering eating areas. Do not get in eyes or on skin or clothing. Do not ingest. Avoid breathing vapor or mist. Use only with adequate ventilation. Wear appropriate respirator when ventilation is inadequate. Do not enter storage areas and confined spaces unless adequately ventilated. Keep in the original container or an approved alternative made from a compatible material, kept tightly closed when not in use. Store and use away from heat, sparks, open flame or any other ignition source. Use explosion-proof electrical (ventilating, lighting and material handling) equipment. Use non-sparking tools. Take precautionary measures against electrostatic discharges. To avoid fire or explosion, dissipate static electricity during transfer by grounding and bonding containers and equipment before transferring material. Empty containers retain product residue and can be hazardous. Do not reuse container.

Storage : Store in accordance with local regulations. Store in a segregated and approved area. Store in original container protected from direct sunlight in a dry, cool and well-ventilated area, away from incompatible materials (see Section 10) and food and drink. Eliminate all ignition sources. Separate from oxidizing materials. Keep container tightly closed and sealed until ready for use. Containers that have been opened must be carefully resealed and kept upright to prevent leakage. Do not store in unlabeled containers. Use appropriate containment to avoid environmental contamination.

8. Exposure controls/personal protection

Ingredient	Exposure limits
xylene	**ACGIH TLV (United States, 6/2013).** TWA: 100 ppm, 0 times per shift, 8 hours. TWA: 434 mg/m³, 0 times per shift, 8 hours. STEL: 150 ppm, 0 times per shift, 15 minutes. STEL: 651 mg/m³, 0 times per shift, 15 minutes. **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm, 0 times per shift, 8 hours. TWA: 435 mg/m³, 0 times per shift, 8 hours. STEL: 150 ppm, 0 times per shift, 15 minutes. STEL: 655 mg/m³, 0 times per shift, 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm, 0 times per shift, 8 hours. TWA: 435 mg/m³, 0 times per shift, 8 hours.
ethylbenzene	**ACGIH TLV (United States, 6/2013).** TWA: 20 ppm, 0 times per shift, 8 hours. **OSHA PEL 1989 (United States, 3/1989).** TWA: 100 ppm, 0 times per shift, 8 hours. TWA: 435 mg/m³, 0 times per shift, 8 hours. STEL: 125 ppm, 0 times per shift, 15 minutes.

8. Exposure controls/personal protection

	STEL: 545 mg/m³, 0 times per shift, 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 100 ppm, 0 times per shift, 10 hours. TWA: 435 mg/m³, 0 times per shift, 10 hours. STEL: 125 ppm, 0 times per shift, 15 minutes. STEL: 545 mg/m³, 0 times per shift, 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 100 ppm, 0 times per shift, 8 hours. TWA: 435 mg/m³, 0 times per shift, 8 hours.
kerosene (petroleum)	**NIOSH REL (United States, 10/2013).** TWA: 100 mg/m³ 10 hours. **ACGIH TLV (United States, 6/2013). Absorbed through skin.** TWA: 200 mg/m³, (as total hydrocarbon vapor) 8 hours.
naphthalene	**ACGIH TLV (United States, 6/2013). Absorbed through skin.** TWA: 10 ppm, 0 times per shift, 8 hours. TWA: 52 mg/m³, 0 times per shift, 8 hours. STEL: 15 ppm, 0 times per shift, 15 minutes. STEL: 79 mg/m³, 0 times per shift, 15 minutes. **OSHA PEL 1989 (United States, 3/1989).** TWA: 10 ppm, 0 times per shift, 8 hours. TWA: 50 mg/m³, 0 times per shift, 8 hours. STEL: 15 ppm, 0 times per shift, 15 minutes. STEL: 75 mg/m³, 0 times per shift, 15 minutes. **NIOSH REL (United States, 10/2013).** TWA: 10 ppm, 0 times per shift, 10 hours. TWA: 50 mg/m³, 0 times per shift, 10 hours. STEL: 15 ppm, 0 times per shift, 15 minutes. STEL: 75 mg/m³, 0 times per shift, 15 minutes. **OSHA PEL (United States, 2/2013).** TWA: 10 ppm, 0 times per shift, 8 hours. TWA: 50 mg/m³, 0 times per shift, 8 hours.

Recommended monitoring procedures : If this product contains ingredients with exposure limits, personal, workplace atmosphere or biological monitoring may be required to determine the effectiveness of the ventilation or other control measures and/or the necessity to use respiratory protective equipment. Reference should be made to appropriate monitoring standards. Reference to national guidance documents for methods for the determination of hazardous substances will also be required.

Engineering measures : Use only with adequate ventilation. Use process enclosures, local exhaust ventilation or other engineering controls to keep worker exposure to airborne contaminants below any recommended or statutory limits. The engineering controls also need to keep gas, vapor or dust concentrations below any lower explosive limits. Use explosion-proof ventilation equipment.

Hygiene measures : Wash hands, forearms and face thoroughly after handling chemical products, before eating, smoking and using the lavatory and at the end of the working period. Appropriate techniques should be used to remove potentially contaminated clothing. Wash contaminated clothing before reusing. Ensure that eyewash stations and safety showers are close to the workstation location.

Personal protection

Respiratory : Use a properly fitted, air-purifying or supplied-air respirator complying with an approved standard if a risk assessment indicates this is necessary. Respirator selection must be based on known or anticipated exposure levels, the hazards of the product and the safe working limits of the selected respirator.

8. Exposure controls/personal protection

Hands	: Chemical-resistant, impervious gloves complying with an approved standard should be worn at all times when handling chemical products if a risk assessment indicates this is necessary. Considering the parameters specified by the glove manufacturer, check during use that the gloves are still retaining their protective properties. It should be noted that the time to breakthrough for any glove material may be different for different glove manufacturers. In the case of mixtures, consisting of several substances, the protection time of the gloves cannot be accurately estimated.
Eyes	: Safety eyewear complying with an approved standard should be used when a risk assessment indicates this is necessary to avoid exposure to liquid splashes, mists or dusts. If contact is possible, the following protection should be worn, unless the assessment indicates a higher degree of protection: chemical splash goggles.
Skin	: Personal protective equipment for the body should be selected based on the task being performed and the risks involved and should be approved by a specialist before handling this product. When there is a risk of ignition from static electricity, wear anti-static protective clothing. For the greatest protection from static discharges, clothing should include anti-static overalls, boots and gloves.
Environmental exposure controls	: Emissions from ventilation or work process equipment should be checked to ensure they comply with the requirements of environmental protection legislation. In some cases, fume scrubbers, filters or engineering modifications to the process equipment will be necessary to reduce emissions to acceptable levels.

9. Physical and chemical properties

Physical state	: Liquid.
Flash point	: Closed cup: 34.444°C (94°F) [Pensky-Martens.]
Auto-ignition temperature	: Lowest known value: 228.85°C (443.9°F) (kerosene (petroleum)).
Flammable limits	: Greatest known range: Lower: 0.6% Upper: 7% (Solvent naphtha (petroleum), heavy arom.)
Color	: Clear. Amber.
Odor	: Aromatic.
Boiling/condensation point	: Lowest known value: 136.05°C (276.9°F) (ethylbenzene). Weighted average: 157.22°C (315°F)
Specific gravity	: 0.9418 [ASTM D 4052]
Density	: 7.7859 lbs/gal
Vapor pressure	: Highest known value: 1.2 kPa (9.3 mm Hg) (at 20°C) (ethylbenzene). Weighted average: 0.72 kPa (5.4 mm Hg) (at 20°C)
Vapor density	: Highest known value: 5.5 (Air = 1) (Benzene, ethylenated, residues, distn. lights). Weighted average: 4.02 (Air = 1)
Evaporation rate	: Highest known value: 0.84 (ethylbenzene) Weighted average: 0.71compared with butyl acetate
Dispersibility properties	: Not dispersible in the following materials: cold water.
Solubility(ies)	: Insoluble in the following materials: cold water, hot water.

10. Stability and reactivity

Chemical stability	: The product is stable.
Conditions to avoid	: Avoid all possible sources of ignition (spark or flame). Do not pressurize, cut, weld, braze, solder, drill, grind or expose containers to heat or sources of ignition.
Materials to avoid	: Reactive or incompatible with the following materials: oxidizing materials
Hazardous decomposition products	: Under normal conditions of storage and use, hazardous decomposition products should not be produced.

This Material Safety Data Sheet conforms to the requirements of ANSI Z400.1.

10. Stability and reactivity

Possibility of hazardous reactions : Under normal conditions of storage and use, hazardous reactions will not occur.

Conditions of reactivity : Flammable in the presence of the following materials or conditions: open flames, sparks and static discharge.

Hazardous polymerization : Under normal conditions of storage and use, hazardous polymerization will not occur.

11. Toxicological information

Acute toxicity

Product/ingredient name	Test	Species	Result	Dose
xylene	-	Rabbit	LD50 Dermal	4320 mg/kg
	-	Rat	LD50 Oral	4300 mg/kg
ethylbenzene	-	Mouse	LC50 Inhalation Vapor	35500 mg/m³
	-	Rabbit	LC50 Inhalation Vapor	4000 ppm
	-	Rabbit	LD50 Dermal	>5000 mg/kg
Solvent naphtha (petroleum), heavy arom.	-	Rat	LC50 Inhalation Vapor	>590 mg/m³
	-	Rabbit	LD50 Dermal	>2 mL/kg
	-	Rat	LDLo Oral	5 mL/kg
kerosene (petroleum)	-	Rabbit	LD50 Dermal	>2000 mg/kg
	-	Rat	LD50 Oral	15 g/kg
naphthalene	-	Rat	LC50 Inhalation Vapor	>340 mg/m³
	-	Rabbit	LD50 Dermal	>2000 mg/kg
	-	Rat	LD50 Dermal	>2500 mg/kg
	-	Rat	LD50 Oral	490 mg/kg

Irritation/Corrosion

Product/ingredient name	Test	Species	Result	
xylene	-	Rabbit	Eyes - Severe irritant	-
	-	Rat	Skin - Mild irritant	-
	-	Rabbit	Skin - Moderate irritant	-
ethylbenzene	-	Rabbit	Eyes - Severe irritant	-
	-	Rabbit	Skin - Mild irritant	-
Solvent naphtha (petroleum), heavy arom.	-	Rabbit	Skin - Mild irritant	-
	-	Mammal - species unspecified	Eyes - Mild irritant	-
kerosene (petroleum)	-	Rabbit	Skin - Moderate irritant	-
	-	Rabbit	Skin - Severe irritant	-

Carcinogenicity

Classification

Product/ingredient name	ACGIH	IARC	EPA	NIOSH	NTP	OSHA
xylene	A4	3	-	-	-	-
ethylbenzene	A3	2B	-	-	-	-
kerosene (petroleum)	A3	-	-	-	-	-
naphthalene	A4	2B	-	-	Reasonably anticipated to be a human carcinogen.	-

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12. Ecological information

Aquatic ecotoxicity

Product/ingredient name	Result	Species	Exposure
xylene	Acute LC50 3.3 mg/l	Fish	96 hours
ethylbenzene	Acute EC50 4600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	72 hours
	Acute EC50 3600 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Acute EC50 7.2 mg/l	Algae	48 hours
	Acute EC50 2.93 mg/l	Daphnia	48 hours
	Acute LC50 4.2 mg/l	Fish	96 hours
	Chronic NOEC <1000 µg/l Fresh water	Algae - Pseudokirchneriella subcapitata	96 hours
	Chronic NOEC 6800 µg/l Fresh water	Daphnia - Daphnia magna	48 hours
Benzene, ethylenated, residues, distn. lights	Acute EC50 6.2 mg/l (growth rate) Fresh water	Algae	72 hours WAF
	Acute EC50 1.3 mg/l Fresh water	Daphnia	48 hours WAF
Solvent naphtha (petroleum), heavy arom.	Acute EC50 1 to 3 mg/l	Algae	72 hours
	Acute EC50 3 to 10 mg/l	Daphnia	48 hours
	Acute LC50 2 to 5 mg/l	Fish	96 hours
naphthalene	Acute EC50 1.96 mg/l Fresh water	Daphnia - Daphnia magna	48 hours
	Acute LC50 2350 µg/l Marine water	Crustaceans - Palaemonetes pugio	48 hours
	Acute LC50 1.6 mg/l	Fish	96 hours

Other adverse effects : No known significant effects or critical hazards.

13. Disposal considerations

Waste disposal : The generation of waste should be avoided or minimized wherever possible. Dispose of surplus and non-recyclable products via a licensed waste disposal contractor. Disposal of this product, solutions and any by-products should at all times comply with the requirements of environmental protection and waste disposal legislation and any regional local authority requirements. Waste packaging should be recycled. Incineration or landfill should only be considered when recycling is not feasible. This material and its container must be disposed of in a safe way. Care should be taken when handling emptied containers that have not been cleaned or rinsed out. Empty containers or liners may retain some product residues. Vapor from product residues may create a highly flammable or explosive atmosphere inside the container. Do not cut, weld or grind used containers unless they have been cleaned thoroughly internally. Avoid dispersal of spilled material and runoff and contact with soil, waterways, drains and sewers.

Disposal should be in accordance with applicable regional, national and local laws and regulations. Local regulations may be more stringent than regional or national requirements.

The information presented below only applies to the material as supplied. The identification based on characteristic(s) or listing may not apply if the material has been used or otherwise contaminated. It is the responsibility of the waste generator to determine the toxicity and physical properties of the material generated to determine the proper waste identification and disposal methods in compliance with applicable regulations.

Refer to Section 7: HANDLING AND STORAGE and Section 8: EXPOSURE CONTROLS/PERSONAL PROTECTION for additional handling information and protection of employees.

14. Transport information

Regulatory information	UN number	Proper shipping name	Classes	PG*	Label	Additional information
DOT Classification	UN1993	Flammable liquids, n. o.s. (xylene, ethylbenzene) RQ (xylene, ethylbenzene)	3	III		**Reportable quantity** 336.38 lbs / 152.72 kg [42.837 gal / 162.16 L] Package sizes shipped in quantities less than the product reportable quantity are not subject to the RQ (reportable quantity) transportation requirements. **Limited quantity** Yes. **Packaging instruction** **Passenger aircraft** Quantity limitation: 60 L **Cargo aircraft** Quantity limitation: 220 L **Special provisions** B1, B52, IB3, T4, TP1, TP29
IMDG Class	UN1993	FLAMMABLE LIQUID, N.O.S. (xylene, ethylbenzene)	3	III		**Emergency schedules (EmS)** F-E, _S-E_ **Special provisions** 223, 274, 955
IATA-DGR Class	UN1993	Flammable liquid, n.o. s. (xylene, ethylbenzene)	3	III		

PG* : Packing group

Flash point : Closed cup: 34.444°C (94°F) [Pensky-Martens.]

15. Regulatory information

HCS Classification : Flammable liquid
Irritating material
Carcinogen
Target organ effects

U.S. Federal regulations :

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15. Regulatory information

TSCA 4(a) final test rules: naphthalene
TSCA 8(a) PAIR: naphthalene
TSCA 8(a) CDR Exempt/Partial exemption: Not determined
United States inventory (TSCA 8b): All components are listed or exempted.
TSCA 12(b) one-time export: naphthalene

SARA 302/304: sulfuric acid
SARA 311/312 Hazards identification: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard

Clean Water Act (CWA) 307: toluene; naphthalene; ethylbenzene; chloromethane
Clean Water Act (CWA) 311: toluene; naphthalene; ethylbenzene; xylene; o-Xylene; sulfuric acid; Alkylbenzenesulphonic acid; sodium nitrite

Clean Air Act Section 112 (b) Hazardous Air Pollutants (HAPs)	: Listed
Clean Air Act Section 602 Class I Substances	: Not listed
Clean Air Act Section 602 Class II Substances	: Not listed
DEA List I Chemicals (Precursor Chemicals)	: Not listed
DEA List II Chemicals (Essential Chemicals)	: Not listed

SARA 313

	Product name	CAS number	Concentration
Form R - Reporting requirements	xylene ethylbenzene naphthalene	1330-20-7 100-41-4 91-20-3	15 - 30 4.99 - 9.99 0.09 - 0.99
Supplier notification	xylene ethylbenzene naphthalene	1330-20-7 100-41-4 91-20-3	15 - 30 4.99 - 9.99 0.09 - 0.99

SARA 313 notifications must not be detached from the MSDS and any copying and redistribution of the MSDS shall include copying and redistribution of the notice attached to copies of the MSDS subsequently redistributed.

State regulations

Massachusetts	: The following components are listed: ETHYL BENZENE; XYLENE; KEROSINE
New York	: The following components are listed: Naphthalene; Ethylbenzene; Xylene (mixed)
New Jersey	: The following components are listed: NAPHTHALENE; MOTH FLAKES; ETHYL BENZENE; BENZENE, ETHYL-; XYLENES; BENZENE, DIMETHYL-; KEROSENE; FUEL OIL #1
Pennsylvania	: The following components are listed: NAPHTHALENE; BENZENE, ETHYL-; BENZENE, DIMETHYL-; KEROSINE (PETROLEUM)

California Prop. 65

WARNING: This product contains a chemical known to the State of California to cause cancer.
WARNING: This product contains less than 1% of a chemical known to the State of California to cause birth defects or other reproductive harm.

15. Regulatory information

Ingredient name	Cancer	Reproductive	No significant risk level	Maximum acceptable dosage level	Contains : % or ppm
ethylbenzene	Yes.	No.	41 µg/day (ingestion) 54 µg/day (inhalation)	No.	4.99 - 9.99
naphthalene	Yes.	No.	Yes.	No.	0.09 - 0.99
toluene	No.	Yes.	No.	7000 µg/day (ingestion) 13000 µg/day (inhalation)	<10ppm
cumene	Yes.	No.	No.	No.	<10ppm
sulfuric acid	Yes.	No.	No.	No.	<10ppm
methanol	No.	Yes.	No.	23000 µg/day (ingestion) 47000 µg/day (inhalation)	<10ppm
chloromethane	No.	Yes.	No.	No.	<1ppm

Classification according to Regulation (EC) No. 1272/2008 [CLP/GHS]

Flam. Liq. 3, H226
Skin Irrit. 2, H315
Eye Irrit. 2, H319
Aquatic Chronic 3, H412

Classification according to Directive 1999/45/EC [DPD]

Europe

The product is classified as dangerous according to Directive 1999/45/EC and its amendments.

R10
Xn; R20/21
Xi; R38
R52/53

International lists

United States inventory (TSCA 8b)	:	All components are listed or exempted.
Canada inventory	:	All components are listed or exempted.
Australia inventory (AICS)	:	At least one component is not listed.
China inventory (IECSC)	:	All components are listed or exempted.
EU Inventory	:	At least one component is not listed in EINECS but all such components are listed in ELINCS. Please contact your supplier for information on the inventory status of this material.
Japan inventory (ENCS)	:	All components are listed or exempted.
Korea inventory (KECI)	:	Not determined.
New Zealand Inventory of Chemicals (NZIoC)	:	Not determined.
Philippines inventory (PICCS)	:	At least one component is not listed.

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16. Other information

Hazardous Material Information System (U.S.A.) :

Health	*	2
Flammability		3
Physical hazards		0

Caution: HMIS® ratings are based on a 0-4 rating scale, with 0 representing minimal hazards or risks, and 4 representing significant hazards or risks Although HMIS® ratings are not required on MSDSs under 29 CFR 1910. 1200, the preparer may choose to provide them. HMIS® ratings are to be used with a fully implemented HMIS® program. HMIS® is a registered mark of the National Paint & Coatings Association (NPCA). HMIS® materials may be purchased exclusively from J. J. Keller (800) 327-6868.

The customer is responsible for determining the PPE code for this material.

National Fire Protection Association (U.S.A.) :

Copyright ©2001, National Fire Protection Association, Quincy, MA 02269. **This warning system is intended to be interpreted and applied only by properly trained individuals to identify fire, health and reactivity hazards of chemicals. The user is referred to certain limited number of chemicals with recommended classifications in NFPA 49 and NFPA 325, which would be used as a guideline only. Whether the chemicals are classified by NFPA or not, anyone using the 704 systems to classify chemicals does so at their own risk.**

Date of printing	:	**2014-09-29**
Date of issue	:	2014-09-29
Date of previous issue	:	2014-09-24
Version	:	1.01

◸ **Indicates information that has changed from previously issued version.**

Emergency contact numbers for local language support in Asia Pacific region

Country information	Languages supported	Telephone no.:	Location
Australia	English	+61 2 8014 4558	Australia
Bangladesh	Bengali, English	+65 3158 1200	Singapore
Brazil	Portuguese, English	+55 113 711 9144	Brazil
China	Mandarin, English	+86 10 5100 3039	Beijing China
India	Hindi, English	+65 3158 1198	Singapore
Indonesia (local toll free number)	Bahasa Indonesian, English	00780 3011 0293	Indonesia
Japan	Japanese, English	+81 3 4578 9341	Japan
Korea	Korean, English	+65 3158 1285	Singapore
Malaysia	Bahasa Malaysian, English	+60 3 6207 4347	Malaysia
Mexico	Spanish, English	+52 555 004 8763	Mexico
New Zealand	English	+61 9929 1483	Australia
Pakistan	Urdu, English	+65 3158 1329	Singapore
Philippines	Tagalog, English	+65 3158 1203	Singapore

This Material Safety Data Sheet conforms to the requirements of ANSI Z400.1.

16. Other information

Sri Lanka	Sinhalese, English	+65 3158 1195	Singapore
Thailand (local toll free number)	Thai, English	001800 1 2066 6751	Thailand
Vietnam	Vietnamese, English	+65 3158 1255	Singapore

Notice to reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above-named supplier, nor any of its subsidiaries, assumes any liability whatsoever for the accuracy or completeness of the information contained herein.
Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

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United Color Manufacturing, Inc.
P.O. Box 480
Newtown, PA, U.S.A., 18940
Telephone: (215) 860-2165

MATERIAL SAFETY DATA SHEET

SECTION 1 - IDENTIFICATION

Product identifier : **Unisol® Liquid Red BK-50**

Product Code(s) : None reported.

Product Use : Marker dye for petroleum products

Chemical Family : Mixture.

Supplier's name and address:

United Color Manufacturing, Inc.

P.O. Box 480
Newtown, PA, U.S.A.
18940
Website: www.unitedcolor.com

Manufacturer's name and address:

Refer to Supplier

Information Telephone # : 215-860-2165 (Monday - Friday, 9:00 am - 5:00 pm, Eastern Standard Time)

24 Hr. Emergency Tel # : Chemtrec 1-800-424-9300 (Within Continental U.S.); Chemtrec 703-527-3887 (Outside U.S.).

SECTION 2 - HAZARDS IDENTIFICATION

Classification : OSHA: This material is classified as hazardous under OSHA regulations (29CFR 1910.1200). Hazardous classification:
Flammable liquid;
Acute Health Hazard;
Chronic Health Hazard.

WHMIS information: This product is a WHMIS Controlled Product. It meets one or more of the criteria for a controlled product provided in Part IV of the Canadian Controlled Products Regulations (CPR). WHMIS classification:
Class B2 (Flammable Liquids);
Class D2A (Materials Causing Other Toxic Effects, Very Toxic Material);
Class D2B (Materials Causing Other Toxic Effects, Toxic Material).

Emergency Overview : Dark red liquid. Aromatic odour.
Warning! Flammable liquid and vapor. May be harmful or fatal if swallowed. May be an aspiration hazard. Can enter the lungs and cause damage. May be harmful if inhaled. May cause respiratory irritation. May cause central nervous system depression. Causes skin and eye irritation. Contains material which may cause cancer, based on animal data. Possible reproductive hazard. Contains material that may cause adverse reproductive effects, based on animal data. Possible birth defect hazard - contains material that may cause birth defects, based on animal data.

POTENTIAL HEALTH EFFECTS:

Signs and symptoms of short-term (acute) exposure

Inhalation : May cause irritation to the nose, throat and upper respiratory tract. Symptoms may include pain, headache, nausea, vomiting, dizziness, drowsiness and other central nervous system effects. Could result in pulmonary edema (fluid accumulation). Symptoms of pulmonary edema (chest pain, shortness of breath) may be delayed.

Skin : May cause moderate to severe skin irritation. Symptoms may include redness, itching and swelling. May be absorbed through the skin.

Eyes : May cause mild to moderate irritation. Symptoms may include stinging and tearing.

Ingestion : Ingestion may irritate digestive tract and cause nausea, vomiting and diarrhea. Symptoms may include pain, headache, nausea, vomiting, dizziness, drowsiness and other central nervous system effects. May be an aspiration hazard. Aspiration into the lungs during swallowing or subsequent vomiting may cause chemical pneumonitis, which can be fatal.

Effects of long-term (chronic) exposure
: Prolonged or repeated contact may cause drying, cracking and defatting of the skin. Prolonged overexposure may cause liver and kidney effects.

Carcinogenic status : Possible cancer hazard. See TOXICOLOGICAL INFORMATION, Section 11.

Additional health hazards : Potential teratogen. May cause birth defects. See TOXICOLOGICAL INFORMATION, Section 11.

Potential environmental effects
: See ECOLOGICAL INFORMATION, Section 12.

SECTION 3 - COMPOSITION/INFORMATION ON INGREDIENTS

Ingredients	CAS #	Wt.%
Kerosene	8008-20-6	30.00 - 50.00
2-Naphthalenol, 1-[[4-(phenylazo)phenyl]azo]-, ar-heptyl ar',ar''-me derivitives	92257-31-3	20.00 - 40.00
Xylene	1330-20-7	10.00 - 20.00
Heavy aromatic solvent naphtha	64742-94-5	7.00 - 13.00
Ethylbenzene	100-41-4	1.00 - 5.00

SECTION 4 - FIRST AID MEASURES

Inhalation : Immediately remove person to fresh air. If breathing has stopped, give artificial respiration. If breathing is difficult, give oxygen by qualified medical personnel only. Get medical attention.

Skin contact : Wash off immediately with soap and plenty of water while removing all contaminated clothes and shoes. If irritation or symptoms develop, seek medical attention.

Eye contact : Immediately flush eyes with plenty of water for at least 15 minutes. Get medical attention.

Ingestion : Do NOT induce vomiting. Never give anything by mouth to an unconscious person. If vomiting occurs spontaneously, keep victim's head lowered (forward) to reduce the risk of aspiration. Seek immediate medical attention/advice.

Notes For Physician : Symptoms may be delayed. This product is a CNS depressant.

SECTION 5 - FIRE FIGHTING MEASURES

Fire hazards/conditions of flammability
: Flammable liquid and vapor. This material will ignite when exposed to heat, sparks, flames, or other sources of ignition (e.g. static electricity, pilot lights, or mechanical/electrical equipment). Product may float, and be re-ignited at the water's surface. Vapours may be heavier than air and may collect in confined and low-lying areas. Closed containers may rupture if exposed to excess heat or flame due to a build-up of internal pressure.

Flammability classification (OSHA 29 CFR 1910.1200)
: Flammable Liquid Class 1C.

Oxidizing properties : None known.

Explosion data: Sensitivity to mechanical impact / static discharge
: Not expected to be sensitive to mechanical impact. May be sensitive to static discharge. Vapours in the flammable range may be ignited by a static discharge of sufficient energy.

Suitable extinguishing media : Dry chemical, foam, carbon dioxide and water fog. Do not use water jet, as this may spread burning material.

Special fire-fighting procedures/equipment
: Firefighters should wear proper protective equipment and self-contained breathing apparatus with full face piece operated in positive pressure mode. Move containers from fire area if safe to do so. Water spray may be useful in cooling equipment exposed to heat and flame.

Hazardous combustion products
: Carbon oxides; Nitrogen oxides; Sulphur oxides; Aldehydes; Hydrocarbons; irritating fumes and smoke.

NFPA Rating

0 - Minimal	1 - Slight	2 - Moderate	3 - Serious

: *Health:* 2 *Flammability:* 3 *Instability:* 0 *Special Hazards:* None.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

Personal precautions : All persons dealing with the clean-up should wear the appropriate chemically protective equipment. Keep all other personnel upwind and away from the spill/release. Restrict access to area until completion of clean-up. Refer to protective measures listed in sections 7 and 8.

Environmental precautions : Ensure spilled product does not enter drains, sewers, waterways, or confined spaces. For large spills, dike the area to prevent spreading.

Spill response/cleanup : Ventilate area of release. Remove all sources of ignition. Use only non-sparking tools and equipment in the clean-up process. Contain and absorb spilled liquid with non-combustible, inert absorbent material (e.g. sand), then place absorbent material into a container for later disposal (see Section 13). Notify the appropriate authorities as required.

Prohibited materials : Do not use combustible absorbents, such as sawdust.

Special spill response procedures
: In case of a transportation accident, in the United States contact CHEMTREC at 1-800-424-9300 or International at 1-703-527-3887. If a spill/release in excess of the EPA reportable quantity is made into the environment, immediately notify the national response center in the United States (phone: 1-800-424-8802).
US CERCLA Reportable quantity (RQ): Xylene (100 lbs / 45.4 kg); Ethylbenzene (1000 lbs / 454 kg)

SECTION 7 - HANDLING AND STORAGE

Safe Handling procedures : Use in a well-ventilated area. Wear suitable protective equipment during handling. Do not ingest. Avoid breathing vapour or mist. Avoid contact with skin, eyes and clothing. Keep away from heat, sparks, and open flames. Use proper bonding and grounding techniques when transferring liquid. Avoid contact with incompatible materials. Wash thoroughly after handling.

Storage requirements : Store in a cool, dry, well-ventilated area. Store away from incompatibles and out of direct sunlight. Storage area should be clearly identified, clear of obstruction and accessible only to trained and authorized personnel. Inspect periodically for damage or leaks. No smoking in the area.

Incompatible materials : Strong oxidizing agents; Acids; Reducing agents.

Special packaging materials : Always keep in containers made of the same materials as the supply container.

SECTION 8 - EXPOSURE CONTROLS AND PERSONAL PROTECTION

Exposure Limits

Ingredients	ACGIH TLV TWA	ACGIH TLV STEL	OSHA PEL PEL	OSHA PEL STEL
Kerosene	200 mg/m³ (jet fuel/Kerosene)	N/Av	N/Av	N/Av
2-Naphthalenol, 1-[[4-(phenylazo)phenyl]azo]-, ar-heptyl ar',ar''-me derivitives	N/Av	N/Av	N/Av	N/Av
Xylene	100 ppm	150 ppm	100 ppm	N/Av
Heavy aromatic solvent naphtha	N/Av	N/Av	500 ppm (as petroleum distillates, naphtha)	N/Av
Ethylbenzene	20 ppm	N/Av	100 ppm	N/Av

Ventilation and engineering measures : Use general or local exhaust ventilation to maintain air concentrations below recommended exposure limits.

Respiratory protection : If the TLV is exceeded, a NIOSH/MSHA-approved respirator is advised. Confirmation of which type of respirator is most suitable for the intended application should be obtained from respiratory protection suppliers.

Skin protection : Impervious gloves must be worn when using this product. Advice should be sought from glove suppliers.

Eye / face protection : Chemical splash goggles must be worn when handling this material.

Other protective equipment : Wear resistant clothing and boots. Other equipment may be required depending on workplace standards. An eyewash station and safety shower should be made available in the immediate working area.

General hygiene considerations : Avoid breathing vapour or mist. Avoid contact with skin, eyes and clothing. Do not eat, drink, smoke or use cosmetics while working with this product. Upon completion of work, wash hands before eating, drinking, smoking or use of toilet facilities. Remove and wash contaminated clothing before re-use. Do not take contaminated clothing home.

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES

Physical state : liquid

Appearance : Dark red liquid.

Odour : aromatic

Odour threshold : N/Av

pH : N/Av

Boiling point : N/Av

Specific gravity : N/Av

Melting/Freezing point : < - 30°C (< - 22°F)

Coefficient of water/oil distribution : N/Av

Vapour pressure (mmHg @ 20° C / 68° F) : N/Av

Solubility in water : insoluble

Vapour density (Air = 1) : N/Av

Evaporation rate (n-Butyl acetate = 1) : N/Av

Volatile organic Compounds (VOC's) : N/Av

Volatiles (% by weight) : N/Av

Flash point : 35 - 40°C (95 - 104°F)

Flash point Method : Tag closed cup

Auto-ignition temperature : N/Av

Lower flammable limit (% by vol.) : N/Av

Upper flammable limit (% by vol.) : N/Av

Flame Projection Length : N/Ap

Flashback observed : N/Ap

Viscosity : < 1.0 cps @ 40°C (104°F)

Absolute pressure of container : N/Ap

Section 10: Stability And Reactivity

Stability and reactivity : Stable under the recommended storage and handling conditions prescribed.

Hazardous polymerization : Will not occur.

Conditions to avoid : Avoid heat and open flame. Ensure adequate ventilation, especially in confined areas.

Materials To Avoid And Incompatibility : Oxidizing agents; Acids; Reducing agents.

Hazardous decomposition products : None known, refer to hazardous combustion products in Section 5.

SECTION 11 - TOXICOLOGICAL INFORMATION

Target organs : Eyes, skin, respiratory system, central nervous system, liver and kidneys.

Routes of exposure : *Inhalation:* YES *Skin Absorption:* YES *Skin & Eyes:* YES *Ingestion:* YES

Toxicological data : There is no available data for the product itself, only for the ingredients. See below for individual ingredient acute toxicity data.

Ingredients	LC_{50}(4hr) inh, rat	LD_{50} (Oral, rat)	LD_{50} (Rabbit, dermal)
Kerosene	> 5000 mg/m³	> 5000 mg/kg	> 2000 mg/kg
2-Naphthalenol, 1-[[4-(phenylazo)phenyl]azo]-, ar-heptyl ar',ar''-me derivitives	N/Av	> 5000 mg/kg	N/Av
Xylene	6350 ppm	3523 mg/kg	12,180 mg/kg
Heavy aromatic solvent naphtha	> 11.4 mg/L/6H	> 6000 mg/kg	> 3160 mg/kg
Ethylbenzene	4000 ppm	3500 mg/kg	15,380 mg/kg

Carcinogenic status : This product contains Ethylbenzene, an IARC Group 2B and ACGIH Group A3 carcinogen. Contains an o-Toluidine-based azo dye. Metabolic studies on some Azo-dyes, following prolonged skin or oral cavity contact, have detected reduction of azo bonds to aromatic amines. This product, therefore, could potentially metabolize to o-toluidine and o-aminoazotoluene upon prolonged skin or oral cavity contact. o-Toluidine and o-aminoazotoluene have been identified as animal carcinogens.

Reproductive effects : May affect reproductive system.
Contains: a version of 2-Naphthalenol, 1-[[4-(phenylazo)phenyl]azo]-, ar-heptyl ar',ar''-me derivitives.
A reproductive screening study in rats with some versions of 2-Naphthalenol, 1-[[4-(phenylazo)phenyl]azo]-, ar-heptyl ar',ar''-me derivitives produced adverse effects on reproduction [ovarian atrophy; reduced litter size; reduced pup weight with no apparent abnormal morphology of the surviving pups] at 20 and 80 mg/kg/day. The relevance of these findings for humans is uncertain, but may be predictive of the potential to cause harm.

Teratogenicity : This product contains Xylene. Xylene may cause fetotoxic effects at doses which are not maternally toxic, based on animal data.

Mutagenicity : Not expected to be mutagenic in humans.

Epidemiology : Not available.

Sensitization to material : Not expected to be a skin or respiratory sensitizer.

Synergistic materials : Not available.

Irritancy : Moderate skin irritant. Moderate eye irritant.

other important hazards : See Section 2 for additional information.

Conditions aggravated by overexposure

: Pre-existing skin, eye, respiratory and central nervous system disorders.

SECTION 12 - ECOLOGICAL INFORMATION

Ecotoxicity : No data is available on the product itself. The ecological characteristics of this product have not been fully investigated. The product should not be allowed to enter drains or water courses, or be deposited where it can affect ground or surface waters. Contains: Xylene; Ethylbenzene; Kerosene; Solvent naphtha (petroleum), heavy aromatic.

The acute toxicity of xylene is (ECOTOX):
Toxicity to fish - LC50/96h/rainbow trout = 8.2 mg/L
Toxicity to daphnia - EC50/24h/ Daphnia magna (Water flea) = 75.5 mg/L

The acute toxicity of ethylbenzene is (OECD):
Toxicity to fish - LC50/96h/rainbow trout = 4.2 mg/L
Toxicity to daphnia - LC50/48h/daphnia = 1.81 mg/L
Toxicity to algae - EC50/96h/green algae = 3.6 mg/L

The acute toxicity of Kerosene is (literature):
Toxicity to fish - LC50/96h expected to be 10 - 100 mg/L
Toxicity to daphnia - EC50/48h expected to be 10 - 100 mg/L
Toxicity to algae - EC50/72h expected to be 10 - 100 mg/L

The acute toxicity of solvent naphtha (petroleum), heavy aromatic is (supplier):
Toxicity to fish - LC50/96h/rainbow trout = 3.6 mg/L
Toxicity to daphnia - EC50/48h/daphnia = 1.1 mg/L
Toxicity to algae
EC50/72h/algae = 7.9 mg/L
NOEL/72h/algae = 0.2 mg/L

This product also contains: a version of 2-Naphthalenol, 1-[[4-(phenylazo)phenyl]azo]-, ar-heptyl ar',ar''-me derivitives. There is no available data on the environmental acute toxicity of this azo dye.

Mobility : No data is available on the product itself.

Persistence : No data is available on the product itself. Contains: Xylene; Ethylbenzene; Kerosene.
Xylene is considered to be inherently biodegradable.
Ethylbenzene is considered to be inherently biodegradable.
Kerosene is not considered to be readily biodegradable.

Bioaccumulation potential : No data is available on the product itself. Contains: Xylene; Ethylbenzene.
The log Pow for Xylene is 3.12.
The log Pow for Ethylbenzene is 3.15.

Other Adverse Environmental effects

: No additional information.

SECTION 13 - DISPOSAL CONSIDERATIONS

Handling for Disposal : Handle waste according to recommendations in Section 7. Empty containers retain residue (liquid and/or vapour) and can be dangerous. Do not cut, weld, drill or grind on or near this container.

Methods of Disposal : Dispose of in accordance with federal, provincial and local hazardous waste laws.

RCRA : If this product, as supplied, becomes a waste in the United States, it may meet the criteria of a hazardous waste as defined under RCRA, Title 40 CFR 261. It is the responsibility of the waste generator to determine the proper waste identification and disposal method. For disposal of unused or waste material, check with local, state and federal environmental agencies.

SECTION 14: TRANPORT INFORMATION

Regulatory Information	UN Number	Shipping Name	Class	Packing Group	Label
49CFR/DOT	UN1993	Flammable liquids, n.o.s. (Kerosene; Xylene)	3	III	
49CFR/DOT Additional information	May be shipped as Limited Quantity when transported in containers no larger than 5.0 Litres; in packages not exceeding 30 kg gross mass. Refer to 49 CFR Section 173.150.				
TDG	UN1993	FLAMMABLE LIQUID, N.O.S. (Kerosene; Xylene)	3	III	
TDG Additional information	May be shipped as Limited Quantity when transported in containers no larger than 5.0 Litres; in packages not exceeding 30 kg gross mass. Under the TDGR, refer to Section 1.17 for additional exemption information, if shipping under this exemption.				
ICAO/IATA	UN1993	Flammable liquid, n.o.s. (Kerosene; Xylene)	3	III	
ICAO/IATA Additional information	Refer to the appropriate Packing Instruction, prior to shipping this material. Review all State and Operator Variations, prior to shipping this material.				
IMDG	UN1993	FLAMMABLE LIQUID, N.O.S. (Kerosene; Xylene)	3	III	
IMDG Additional information	May be shipped as Limited Quantity when transported in containers no larger than 5.0 Litres; in packages not exceeding 30 kg gross mass. This product does not meet the criteria for an environmentally hazardous mixture, according to the IMDG Code.				

SECTION 15 - REGULATORY INFORMATION

US Federal Information:

TSCA: All listed ingredients appear on the Toxic Substances Control Act (TSCA) inventory.

US CERCLA Reportable quantity (RQ): Xylene (100 lbs / 45.4 kg); Ethylbenzene (1000 lbs / 454 kg).

SARA TITLE III: Sec. 302, Extremely Hazardous Substances, 40 CFR 355: No Extremely Hazardous Substances are present in this material.

SARA TITLE III: Sec. 311 and 312, MSDS Requirements, 40 CFR 370 Hazard Classes: Fire Hazard; Acute Health Hazard; Chronic Health Hazard. Under SARA Sections 311 and 312, the EPA has established threshold quantities for the reporting of hazardous chemicals. The current thresholds are 500 pounds for the threshold planning quantity (TPQ), whichever is lower, for extremely hazardous substances and 10,000 pounds for all other hazardous chemicals.

SARA TITLE III: Sec. 313, Toxic Chemicals Notification, 40 CFR 372: This product may be subject to SARA notification requirements, since it contains Toxic Chemical constituents above their de minimus concentrations. This product contains: Ethylbenzene; Xylene.

US State Right to Know Laws:

California Proposition 65: This product contains a chemical known to the State of California to cause cancer. This product contains: Ethylbenzene.

Other U.S. State "Right to Know" Lists: The following chemicals are specifically listed by individual States: Ethylbenzene (CA, MA, MN, NJ, PA, RI); Xylene (CA, MA, MN, NJ, PA, RI).

International Information:

Canadian Environmental Protection Act (CEPA) information: All ingredients listed appear on the Domestic Substances List (DSL).

WHMIS information: Refer to Section 2 for a WHMIS Classification for this product.

This product has been classified according to the hazard criteria of the CPR and the MSDS contains all of the information required by the CPR.

SECTION 16 - OTHER INFORMATION

HMIS Rating : * - Chronic hazard 0 - Minimal 1 - Slight 2 - Moderate 3 - Serious

Health: *2 *Flammability:* 3 *Reactivity:* 0

Legend :

ACGIH: American Conference of Governmental Industrial Hygienists
CAS: Chemical Abstract Services
CERCLA: Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFR: Code of Federal Regulations
DOT: Department of Transportation
EPA: Environmental Protection Agency
HMIS: Hazardous Materials Identification System
HSDB: Hazardous Substances Data Bank
IARC: International Agency for Research on Cancer
Inh: Inhalation
LC: Lethal Concentration
LD: Lethal Dose
MSHA: Mine Safety and Health Administration
N/Ap: Not Applicable
N/Av: Not Available
NFPA: National Fire Protection Association
NIOSH: National Institute of Occupational Safety and Health
NTP: National Toxicology Program
OSHA: Occupational Safety and Health Administration
PEL: Permissible exposure limit
RCRA: Resource Conservation and Recovery Act
RTECS: Registry of Toxic Effects of Chemical Substances
SARA: Superfund Amendments and Reauthorization Act
STEL: Short Term Exposure Limit
TDG: Canadian Transportation of Dangerous Goods Act & Regulations
TLV: Threshold Limit Values
TWA: Time Weighted Average
WHMIS: Workplace Hazardous Materials Identification System

References :

1. ACGIH, Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices for 2012.
2. International Agency for Research on Cancer Monographs, searched 2012.
3. Canadian Centre for Occupational Health and Safety, CCInfoWeb databases, 2012 (Chempendium, HSDB and RTECs).
4. Material Safety Data Sheets from manufacturer.
5. US EPA Title III List of Lists - October 2006 version.
6. California Proposition 65 List - March 16, 2012 version.

Prepared for: United Color Manufacturing, Inc. P.O. Box 480 Newtown, PA, USA 18940 Telephone: 215-860-2165 Please direct all enquiries to United Color Manufacturing, Inc	
Prepared by: ICC The Compliance Center Inc. http://www.thecompliancecenter.com	

DISCLAIMER OF LIABILITY

This Material Safety Data Sheet was prepared by ICC The Compliance Center Inc using information provided by / obtained from United Color Manufacturing, Inc and CCOHS' Web Information Service. The information in the Material Safety Data Sheet is offered for your consideration and guidance when exposed to this product. ICC The Compliance Center Inc and United Color Manufacturing, Inc expressly disclaim all expressed or implied warranties and assume no responsibilities for the accuracy or completeness of the data contained herein. The data in this MSDS does not apply to use with any other product or in any other process.

This Material Safety Data Sheet may not be changed, or altered in any way without the expressed knowledge and permission of ICC The Compliance Center Inc and United Color Manufacturing, Inc.

Preparation Date (mm/dd/yyyy)

: 05/14/2012

END OF DOCUMENT

PERFORMANCE TEST REPORT

JOHN ZINK ENCLOSED GROUND FLARE
INSTALLED AT THE CHEVRON PIPELINE
BULK GASOLINE TERMINAL
IN POCATELLO, 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
POCATELLO, IDAHO 83201

VOC Testing Inc.
ENVIRONMENTAL TESTING
AND EVALUATION

P.O. Box 5892 • San Bernardino, CA 92412 • (909) 381-4664 - FAX (909) 381-4967

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 an 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_3
Average Outlet Concentration (THC)	65.3 ppmv as C_3
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 sited are included in Appendix C.

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

The exhaust gas of the enclosed groung 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 diaphram 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, diaphram 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 CO_2 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 Teledyne 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.

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>
Cc: <Ahenolson@trinityconsultants.com>, <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

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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 (NO_2), 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)

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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

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

Version 1, July 2015

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 NO_2 at the terminal is in compliance with both NO_2 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.

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 SO_2. 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 NO_2 models, and NO_2 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 NO_2, of which NO_2 has a much longer-range receptor grid. NO_2 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 fenceline impacts are strongly expected to be greatest, and their associated receptor grids are denser and closer to the terminal fenceline.

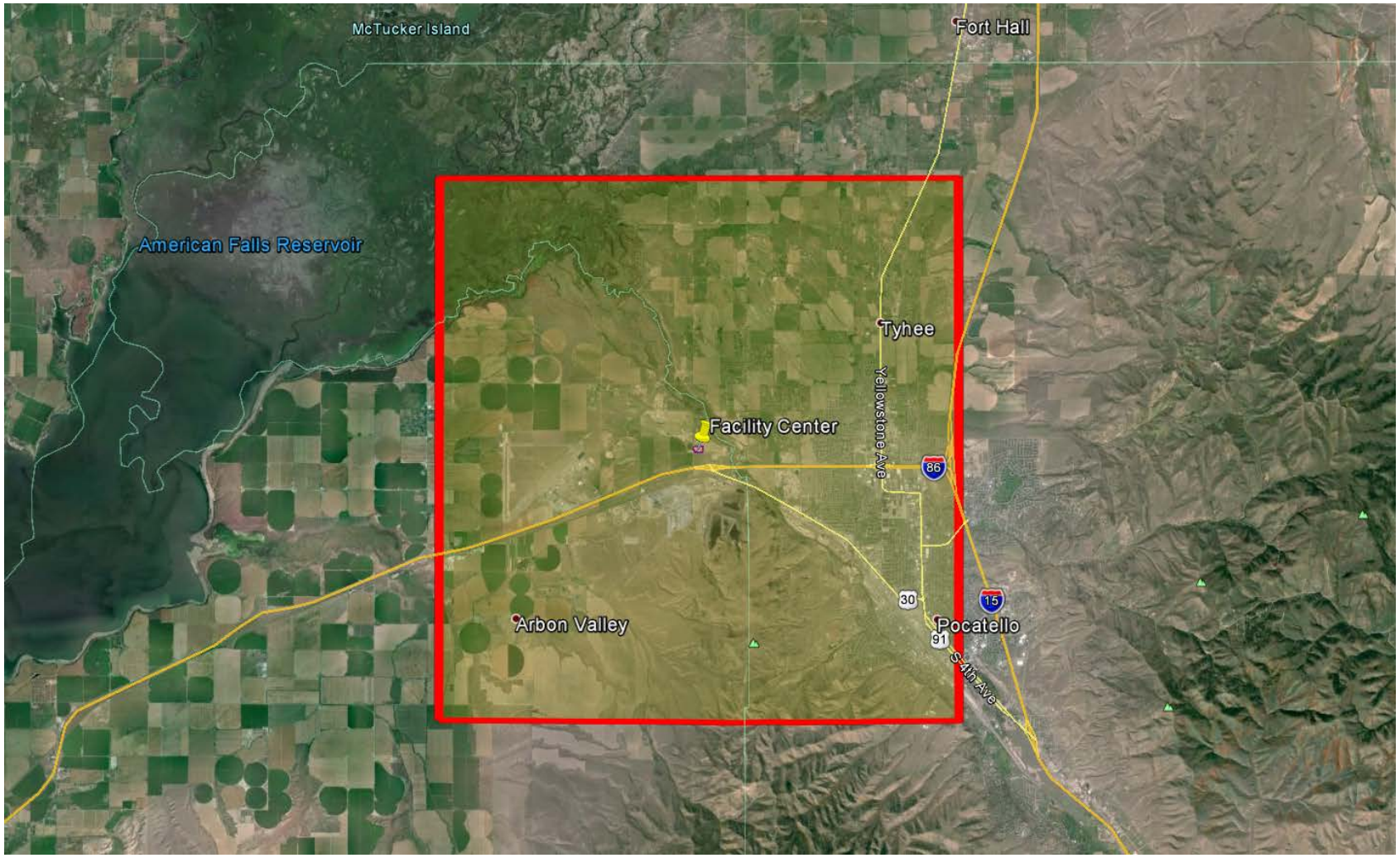


Figure 1. Receptor Grid Extent for Pocatello Terminal Modeling Analysis

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 SO_2 (negligible).

As described in the following sections, emissions of NO_2, 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/m^3)[b]	Regulatory Limit [c] (µg/m^3)	Modeled Design Value Used[d]
PM_{10}[e]	24-hour	5.0	150[f]	Maximum 6th highest[g]
$PM_{2.5}$[h]	24-hour	1.2	35[i]	Mean of maximum 8th highest[j]
	Annual	0.3	12[k]	Mean of maximum 1st highest[l]
Carbon monoxide (CO)	1-hour	2,000	40,000[m]	Maximum 2nd highest[n]
	8-hour	500	10,000[m]	Maximum 2nd 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 4th highest[q]
	3-hour	25	1,300[m]	Maximum 2nd highest[n]
	24-hour	5	365[m]	Maximum 2nd highest[n]
	Annual	1.0	80[r]	Maximum 1st 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 8th highest[t]
	Annual	1.0	100[r]	Maximum 1st highest[n]
Lead (Pb)	3-month[u]	NA	0.15[r]	Maximum 1st highest[n]
	Quarterly	NA	1.5[r]	Maximum 1st 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 O_3.
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 AACC[b] (µg/m^3)
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 (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	___BRC Exempt[a] _X_Emissions Below Level l Thresholds[b] ___Emissions Below Level II Thresholds[c]
$PM_{2.5}$ annual	No	___BRC Exempt _X_Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
PM_{10} 24-hour	No	___BRC Exempt _X_Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
NO_2 1-hour	Yes	___BRC Exempt ___Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
NO_2 annual	Yes	___BRC Exempt ___Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
SO_2 1-hour, 3-hour	No	___BRC Exempt _X_Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
SO_2 annual	No	___BRC Exempt _X_Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
CO 1-hour, 8-hour	No	___BRC Exempt _X_Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
Pb annual	No	_X_BRC Exempt ___Emissions Below Level l 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 NO_2, 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 NO_2 aggregates all expected NO_2 emissions, from all loading and pilot gas combustion. The NO_2 emission rate is tied to the throughput of product at the loading rack. Therefore, short-term emissions of NO_2 (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 NO_2. 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 NO_2, 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 (tpy)	Annual Emissions (g/s)	Short-Term Emissions (lb/hr)	Short-Term Emissions (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.

Table 6. MODELED EMISSIONS RATES FOR SIL ANALYSES

Source ID	Source Description	Pollutant	Averaging Period	Emissions[a] (lb/hr)
VCU	Vapor Combustion Unit	NOx	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.

Table 7. MODELED EMISSIONS RATES FOR NAAQS ANALYSES				
Source ID	**Source Description**	**Pollutant**	**Averaging Period**	**Emissions[a] (lb/hr)**
VCU	Vapor Combustion Unit	NOx	1-hour	2.48
			Annual	2.15
FURN	Comfort Heater	NOx	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 NO_2/NOx Ratio for NOx Chemistry Modeling

A constant NO_2 / NO_X ambient concentration ratio is used in the modeling analysis following the Ambient Ratio Method (ARM). NO_X results are converted to NO_2 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.

TABLE 8. MODELED EMISSIONS RATES FOR TAP ANALYSES				
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.

Table 9. POINT SOURCE STACK PARAMETERS								
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.

Table 10. VOLUME AND AREA SOURCE RELEASE PARAMETERS						
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 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.

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.
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) amd 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. NO_2 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. NO_2 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 NO_2. 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 NO_2: 18 ppb (33.9 μg/m^3)
- Annual NO_2: 3.9 ppb (7.34 μg/m^3)

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

5.9 NOx Chemistry

A constant NO_2 / NO_X ambient concentration ratio is used in the modeling analysis following the Ambient Ratio Method (ARM). NO_X results are converted to NO_2 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 NOx 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 NO_2 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).

Table 12. RESULTS FOR CUMULATIVE NAAQS IMPACT ANALYSES

Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)[a]	Significant Contribution Level ($\mu g/m^3$)	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 NO_2 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).

Table 13. RESULTS FOR CUMULATIVE NAAQS IMPACT ANALYSES					
Pollutant	**Averaging Period**	**Modeled Design Concentration (µg/m³)[a]**	**Background Concentration (µg/m³)**	**Total Impact (µg/m³)**	**NAAQS (µg/m³)**
NO_2[d]	1-hour	32.59[g]	33.84	66.43[g]	188
	Annual	3.57	7.33	10.91	100

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 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.
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.
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).
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.
k. Maximum of 2nd highest modeled concentrations for each year modeled.

_____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.

Table 14. RESULTS FOR TAP IMPACT ANALYSES			
TAP	**Averaging Period**	**Maximum Modeled Impact (µg/m³)[a]**	**AAC or AACC (µg/m³)**
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)	NO_x Emissions (g/s) Short-Term	NO_x Emissions (g/s) Annual	Modeled Annual Emissions Naphthalene (g/s)	Modeled Annual Emissions 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 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 from measured source test value (November 9, 2001):

exit velocity = (flow rate, scf / source test time, hr * (stack temp.) / (standard temp.)) * $(0.3048 \text{ m / ft})^3$ / (π/4 * $(\text{stack diameter, m})^2$) * (1 hr/3,600 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)	Modeled Annual Emissions [d] 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, 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) Short-Term	NO_x Emissions (g/s) Annual	Modeled Annual Emissions Benzene (g/s)	Modeled Annual Emissions 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.

STATE OF IDAHO
DEPARTMENT OF
ENVIRONMENTAL QUALITY

Version 1, July 2015

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 NO_2 at the terminal is in compliance with both NO_2 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.

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 SO_2. 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 NO_2 models, and NO_2 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 NO_2, of which NO_2 has a much longer-range receptor grid. NO_2 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 fenceline impacts are strongly expected to be greatest, and their associated receptor grids are denser and closer to the terminal fenceline.

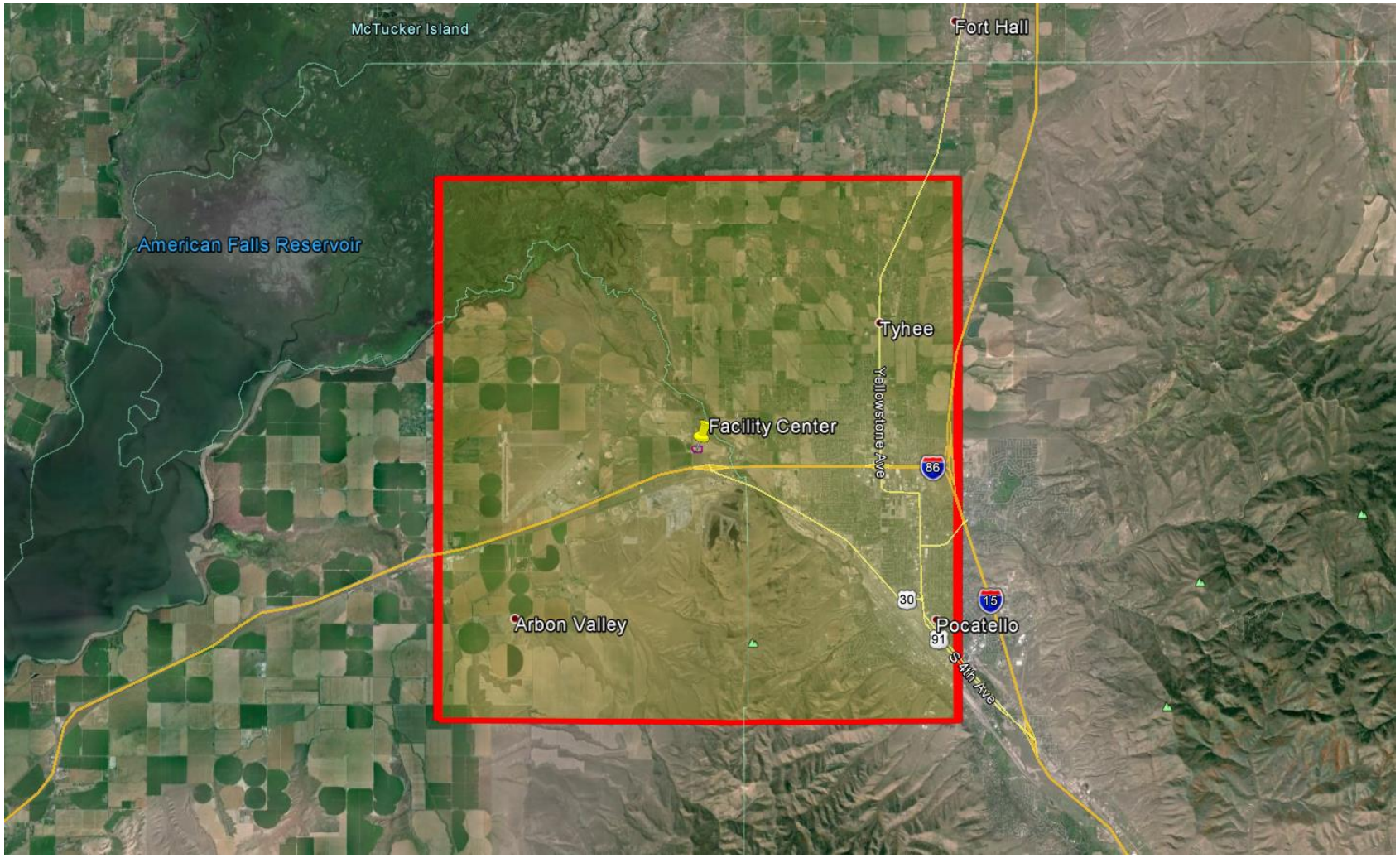


Figure 1. Receptor Grid Extent for Pocatello Terminal Modeling Analysis

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 SO_2 (negligible).

As described in the following sections, emissions of NO_2, 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/m^3)[b]	Regulatory Limit [c] (µg/m^3)	Modeled Design Value Used[d]
PM_{10}[e]	24-hour	5.0	150[f]	Maximum 6th highest[g]
$PM_{2.5}$[h]	24-hour	1.2	35[i]	Mean of maximum 8th highest[j]
	Annual	0.3	12[k]	Mean of maximum 1st highest[l]
Carbon monoxide (CO)	1-hour	2,000	40,000[m]	Maximum 2nd highest[n]
	8-hour	500	10,000[m]	Maximum 2nd 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 4th highest[q]
	3-hour	25	1,300[m]	Maximum 2nd highest[n]
	24-hour	5	365[m]	Maximum 2nd highest[n]
	Annual	1.0	80[r]	Maximum 1st 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 8th highest[t]
	Annual	1.0	100[r]	Maximum 1st highest[n]
Lead (Pb)	3-month[u]	NA	0.15[r]	Maximum 1st highest[n]
	Quarterly	NA	1.5[r]	Maximum 1st 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 O_3.
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 AACC[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 (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	___BRC Exempt[a] _X_Emissions Below Level l Thresholds[b] ___Emissions Below Level II Thresholds[c]
$PM_{2.5}$ annual	No	___BRC Exempt _X_Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
PM_{10} 24-hour	No	___BRC Exempt _X_Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
NO_2 1-hour	Yes	___BRC Exempt ___Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
NO_2 annual	Yes	___BRC Exempt ___Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
SO_2 1-hour, 3-hour	No	___BRC Exempt _X_Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
SO_2 annual	No	___BRC Exempt _X_Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
CO 1-hour, 8-hour	No	___BRC Exempt _X_Emissions Below Level l Thresholds ___Emissions Below Level II Thresholds
Pb annual	No	_X_BRC Exempt ___Emissions Below Level l 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 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 Appendix H of 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 Appendix G of the permit application report. 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 Appendix C of this submittal. Section 4.2.4 of the main application report provides the regulatory justification for exempting certain benzene and naphthalene emissions 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 Appendix B, specifying the VCU release height and stack diameter. 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 NO_2, 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 NO_2 aggregates all expected NO_2 emissions, from all loading and pilot gas combustion. The NO_2 emission rate is tied to the throughput of product at the loading rack. Therefore, short-term emissions of NO_2 (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 NO_2. 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 NO_2, 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 (tpy)	Annual Emissions (g/s)	Short-Term Emissions (lb/hr)	Short-Term Emissions (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.

Table 6. MODELED EMISSIONS RATES FOR SIL ANALYSES

Source ID	Source Description	Pollutant	Averaging Period	Emissions[a] (lb/hr)
VCU	Vapor Combustion Unit	NOx	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.

Table 7. MODELED EMISSIONS RATES FOR NAAQS ANALYSES				
Source ID	**Source Description**	**Pollutant**	**Averaging Period**	**Emissions[a] (lb/hr)**
VCU	Vapor Combustion Unit	NOx	1-hour	2.48
			Annual	2.15
FURN	Comfort Heater	NOx	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 NO_2/NOx Ratio for NOx Chemistry Modeling

A constant NO_2 / NO_X ambient concentration ratio is used in the modeling analysis following the Ambient Ratio Method (ARM). NO_X results are converted to NO_2 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.

TABLE 8. MODELED EMISSIONS RATES FOR TAP ANALYSES				
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.

Table 9. POINT SOURCE STACK PARAMETERS								
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.

Table 10. VOLUME AND AREA SOURCE RELEASE PARAMETERS						
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 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.

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.
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) amd 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

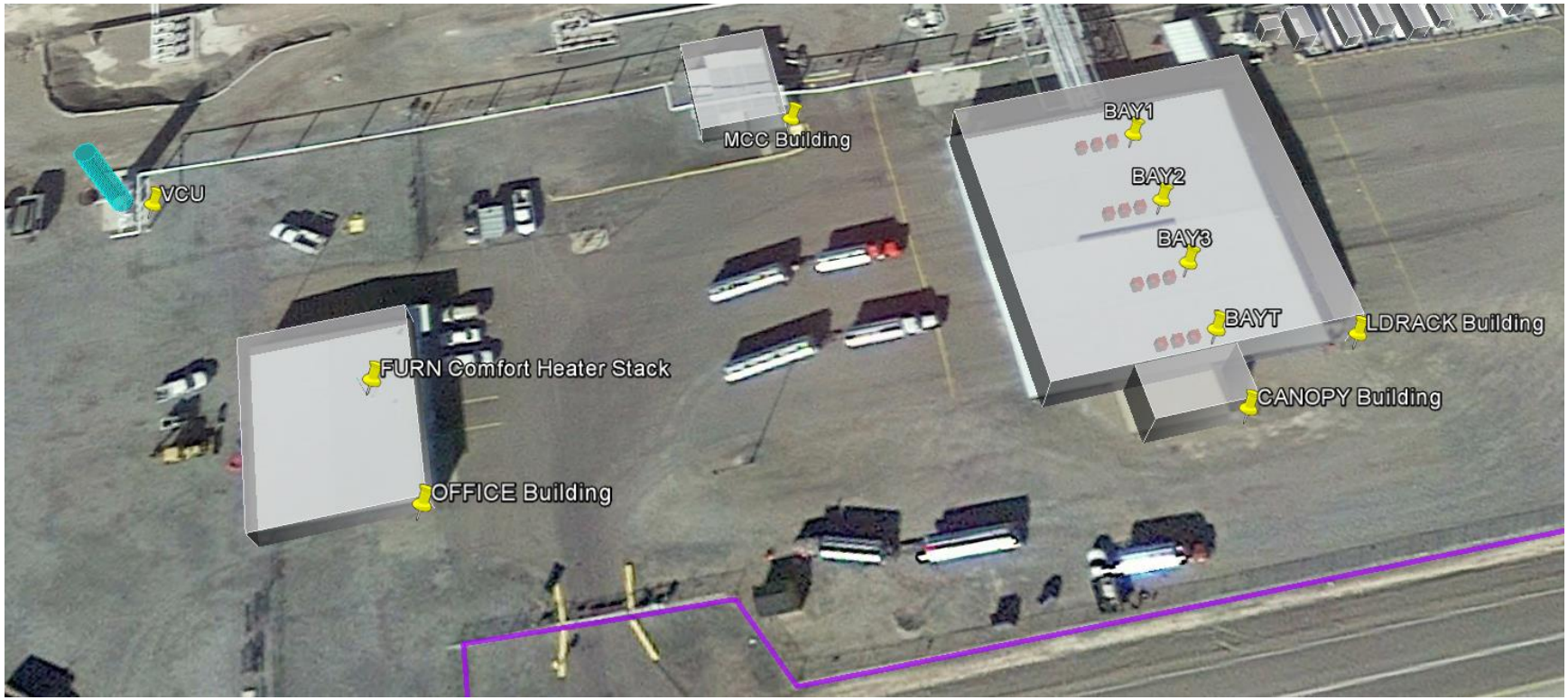


Figure 3. Aerial Image of Pocatello Terminal Emission Sources

_____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. NO_2 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. NO_2 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 NO_2. 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 NO_2: 18 ppb (33.9 μg/m^3)
- Annual NO_2: 3.9 ppb (7.34 μg/m^3)

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

5.9 NOx Chemistry

A constant NO_2 / NO_X ambient concentration ratio is used in the modeling analysis following the Ambient Ratio Method (ARM). NO_X results are converted to NO_2 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 NOx 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 NO_2 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).

Table 12. RESULTS FOR CUMULATIVE NAAQS IMPACT ANALYSES

Pollutant	Averaging Period	Maximum Modeled Concentration ($\mu g/m^3$)[a]	Significant Contribution Level ($\mu g/m^3$)	Impact Percentage of Significant Contribution Level	Cumulative NAAQS Analysis Required
NO_2[d]	1-hour	52.06[g]	7.5	692%	Yes
	Annual	2.68	1.0	268%	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 NO_2 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).

Table 13. RESULTS FOR CUMULATIVE NAAQS IMPACT ANALYSES					
Pollutant	**Averaging Period**	**Modeled Design Concentration ($\mu g/m^3$)[a]**	**Background Concentration ($\mu g/m^3$)**	**Total Impact ($\mu g/m^3$)**	**NAAQS ($\mu g/m^3$)**
NO_2[d]	1-hour	32.59[g]	33.84	66.43[g]	188
	Annual	2.68	7.33	10.01	100

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 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.
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.
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).
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.
k. Maximum of 2nd highest modeled concentrations for each year modeled.

_____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.

Table 14. RESULTS FOR TAP IMPACT ANALYSES			
TAP	**Averaging Period**	**Maximum Modeled Impact ($\mu g/m^3$)[a]**	**AAC or AACC ($\mu g/m^3$)**
Benzene	Annual	3.04×10^{-3}	0.12
Naphthalene (As PAC)	Annual	3.40×10^{-4}	0.014

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 I-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)	NO_x Emissions (g/s) Short-Term	NO_x Emissions (g/s) Annual	Modeled Annual Emissions [f] Naphthalene (g/s)	Modeled Annual Emissions [f] 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 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 from measured source test value (November 9, 2001):

exit velocity = (flow rate, scf / source test time, hr * (stack temp.) / (standard temp.)) * (0.3048 m / ft)^3 / (π/4 * (stack diameter, m)^2) * (1 hr/3,600 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 I-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)	Modeled Annual Emissions [d] 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 I-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) Short-Term	NO_x Emissions (g/s) Annual	Modeled Annual Emissions Benzene (g/s)	Modeled Annual Emissions 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 I-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 I-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 I-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 I-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

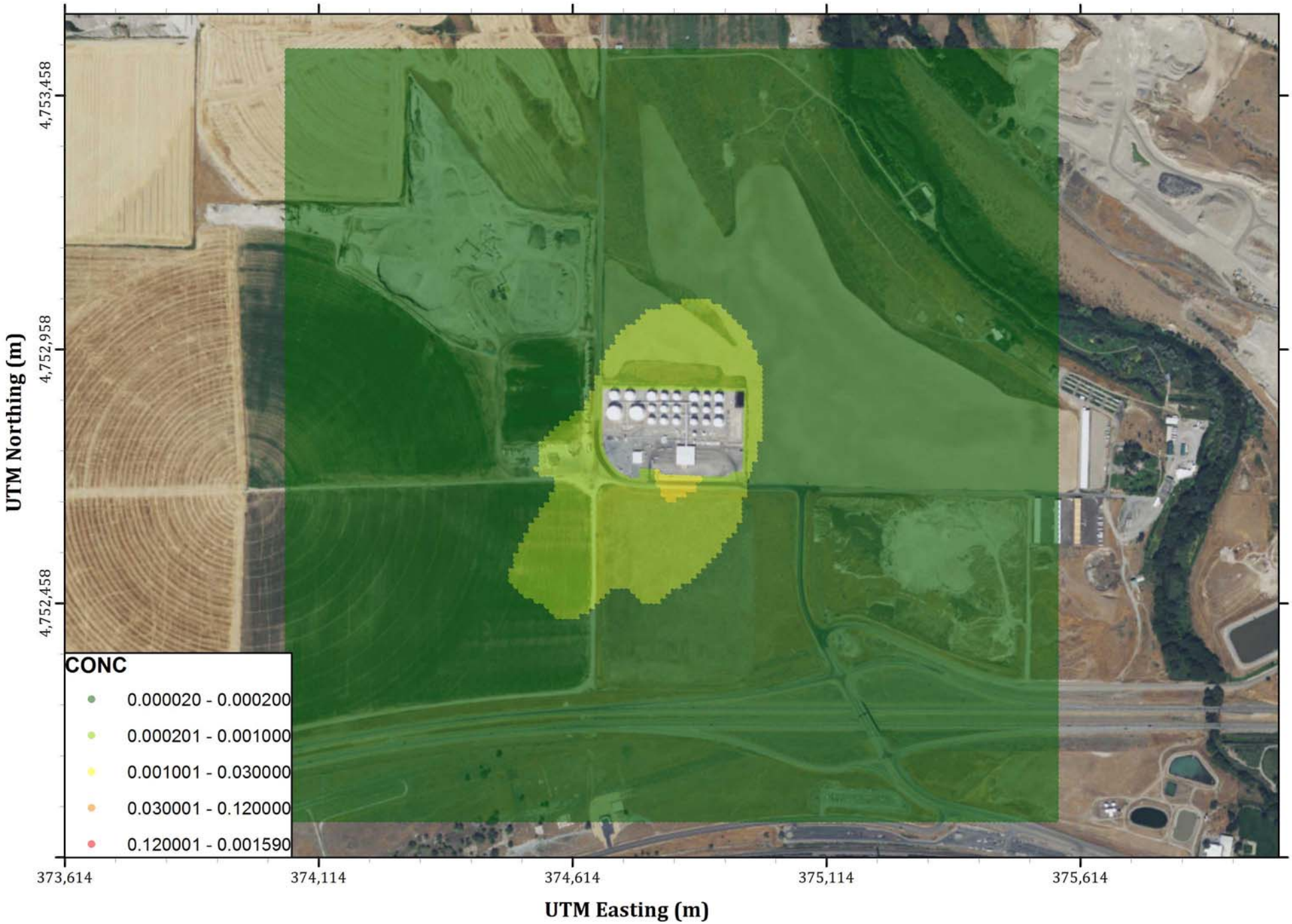
[a] Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.

Table I-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

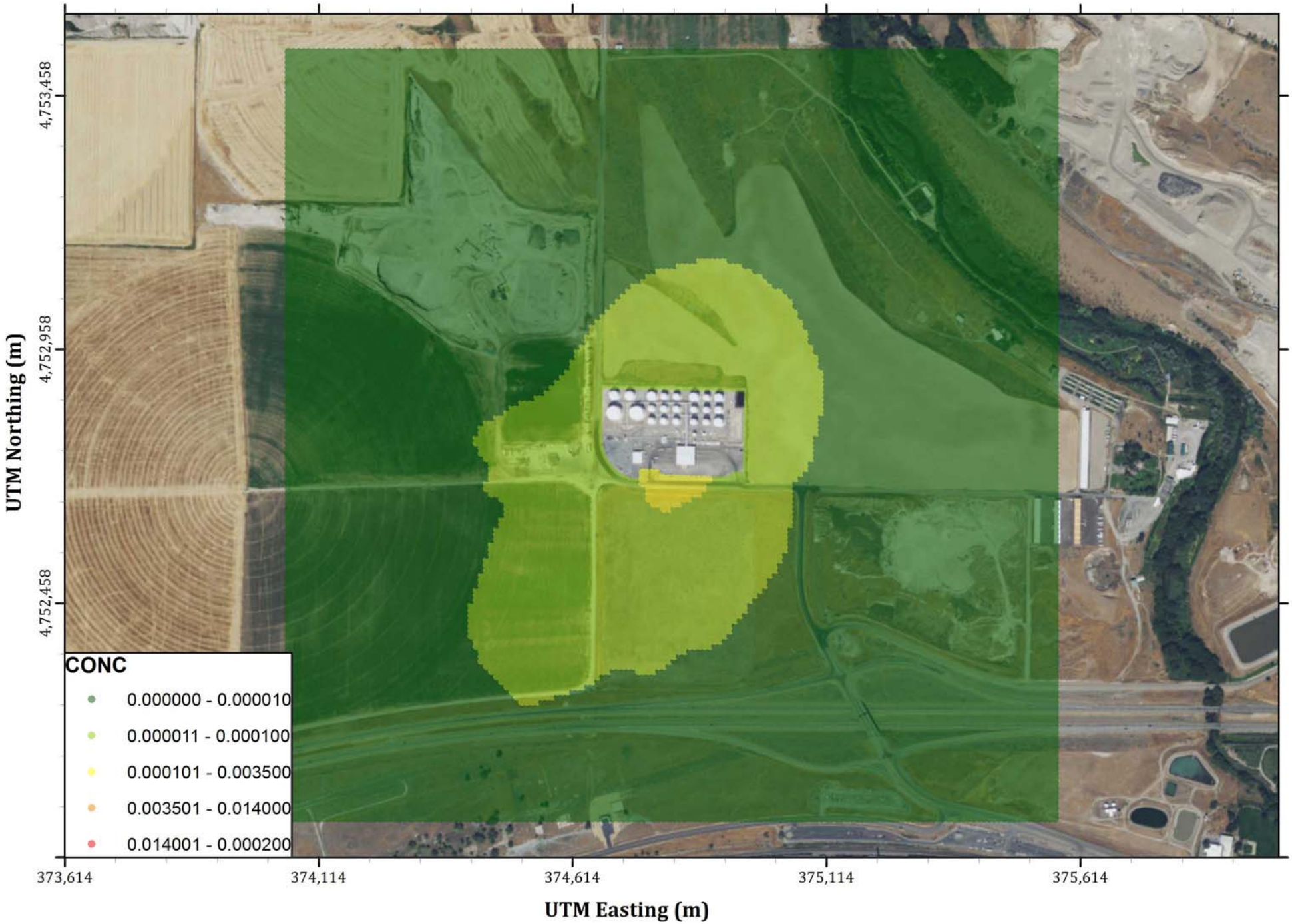
[a] Coordinates for the facility given in UTM Zone 12 with NAD 1983 projection. Coordinates were established using aerial imagery and attached plot plans of the facility.

Figure I-1 - Benzene Annual Averaging Period
2010 Meteorological Year



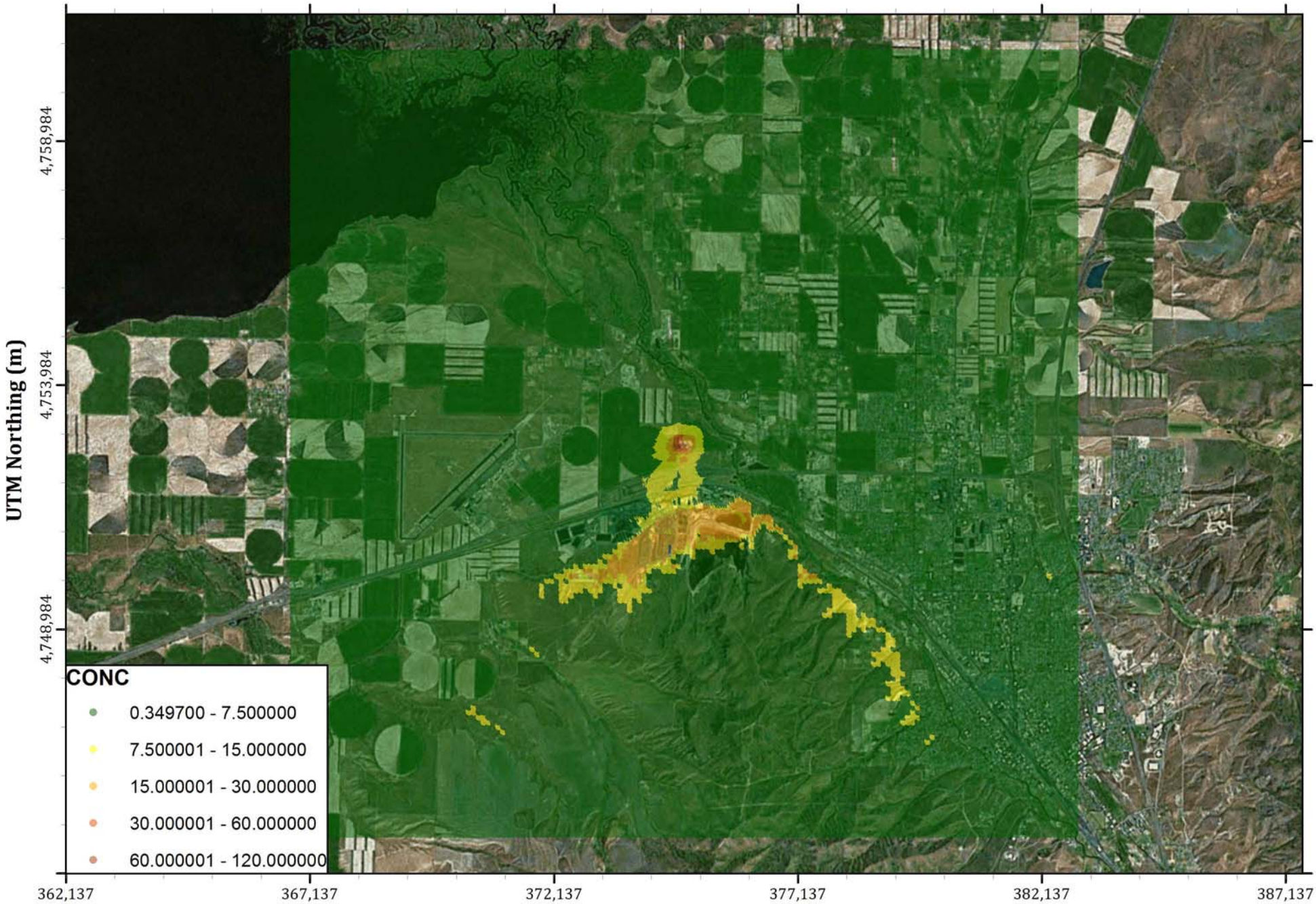
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure I-2 - Naphthalene Annual Averaging Period
2010 Meteorological Year



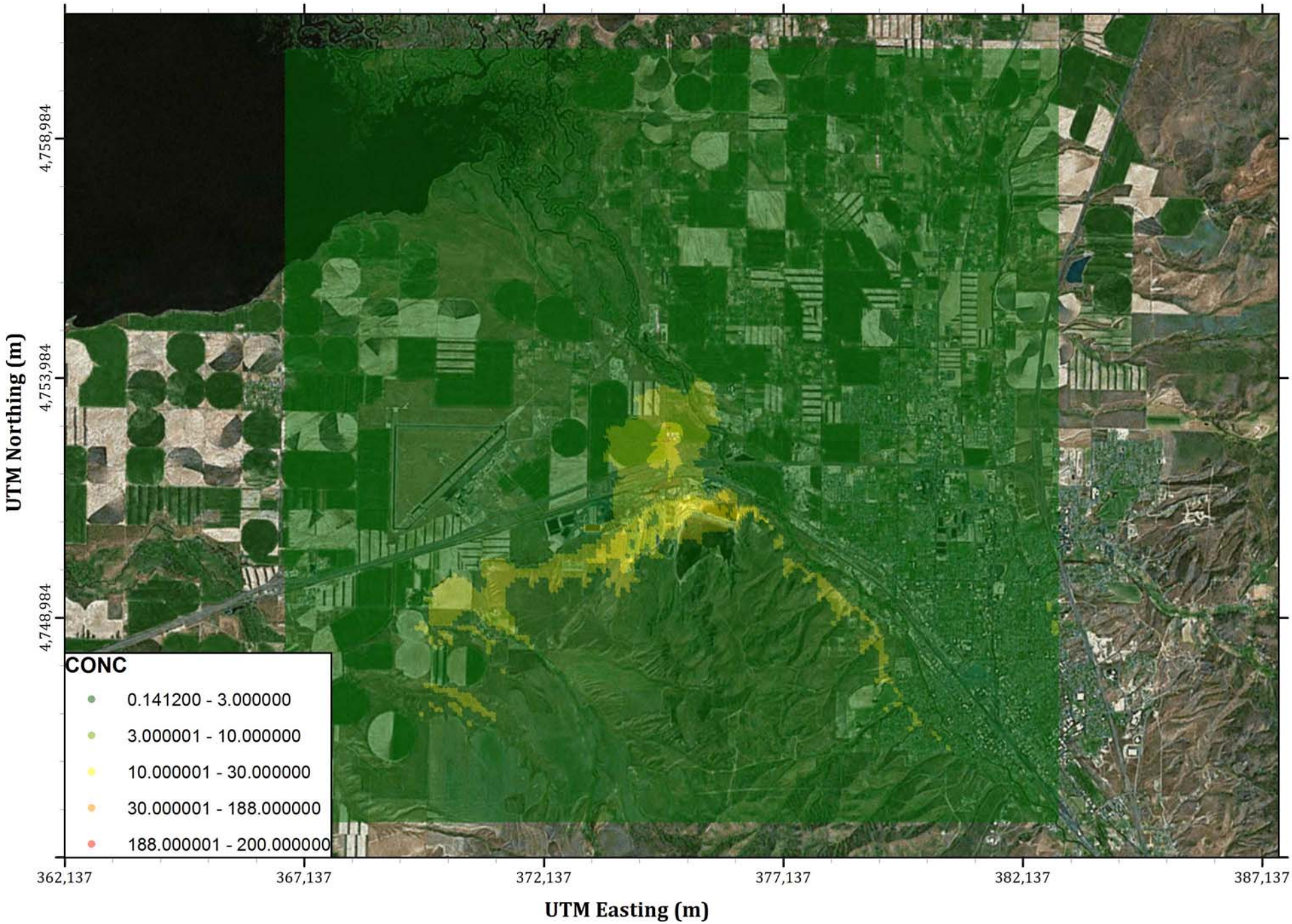
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure I-3 - NO_2 1-Hour Averaging Period
VCU Significance Area
2008-2012 Meteorological Years



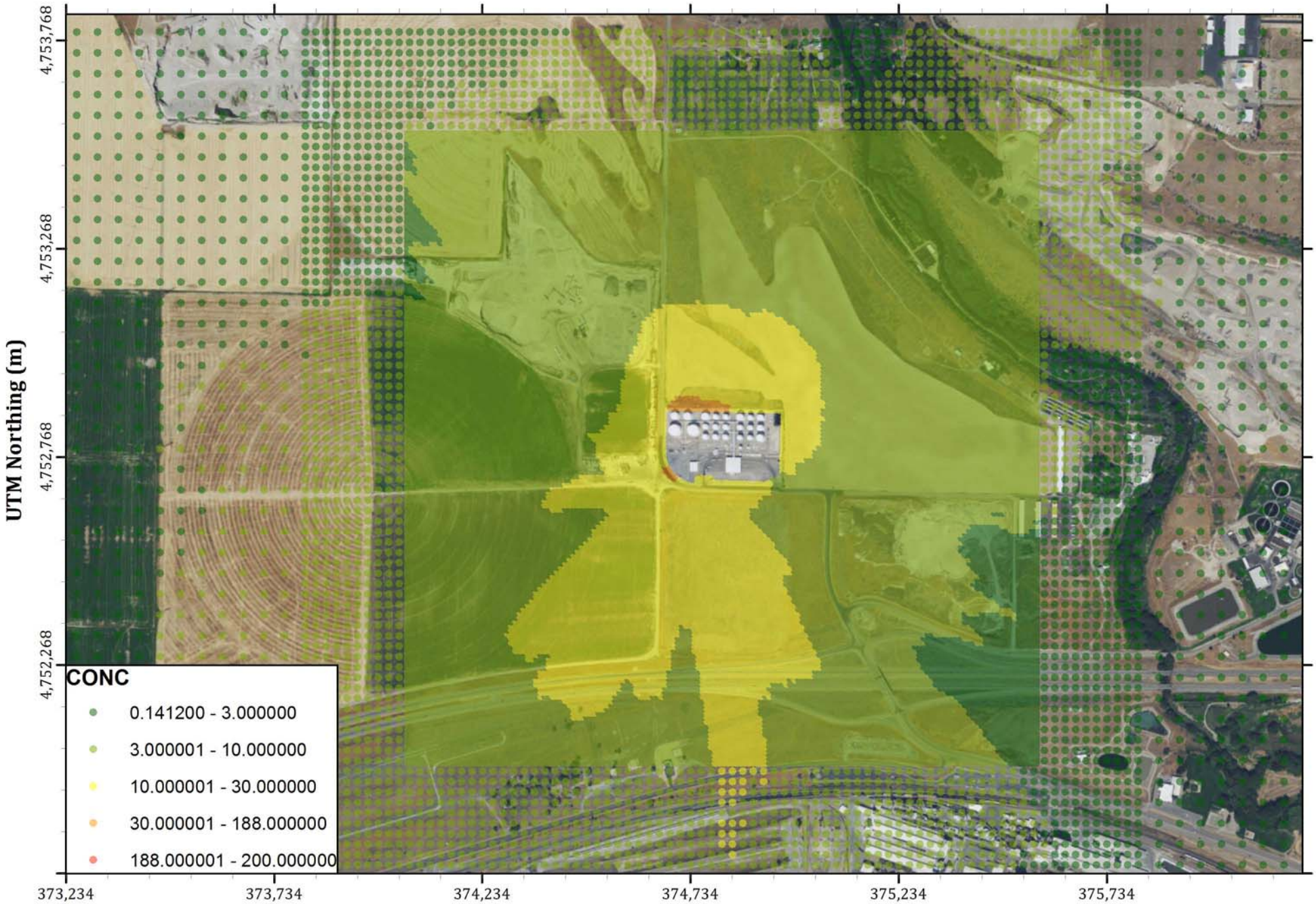
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure I-4 - NO_2 1-Hour Averaging Period Cumulative Impacts for NAAQS Comparison 2008-2012 Meteorological Years



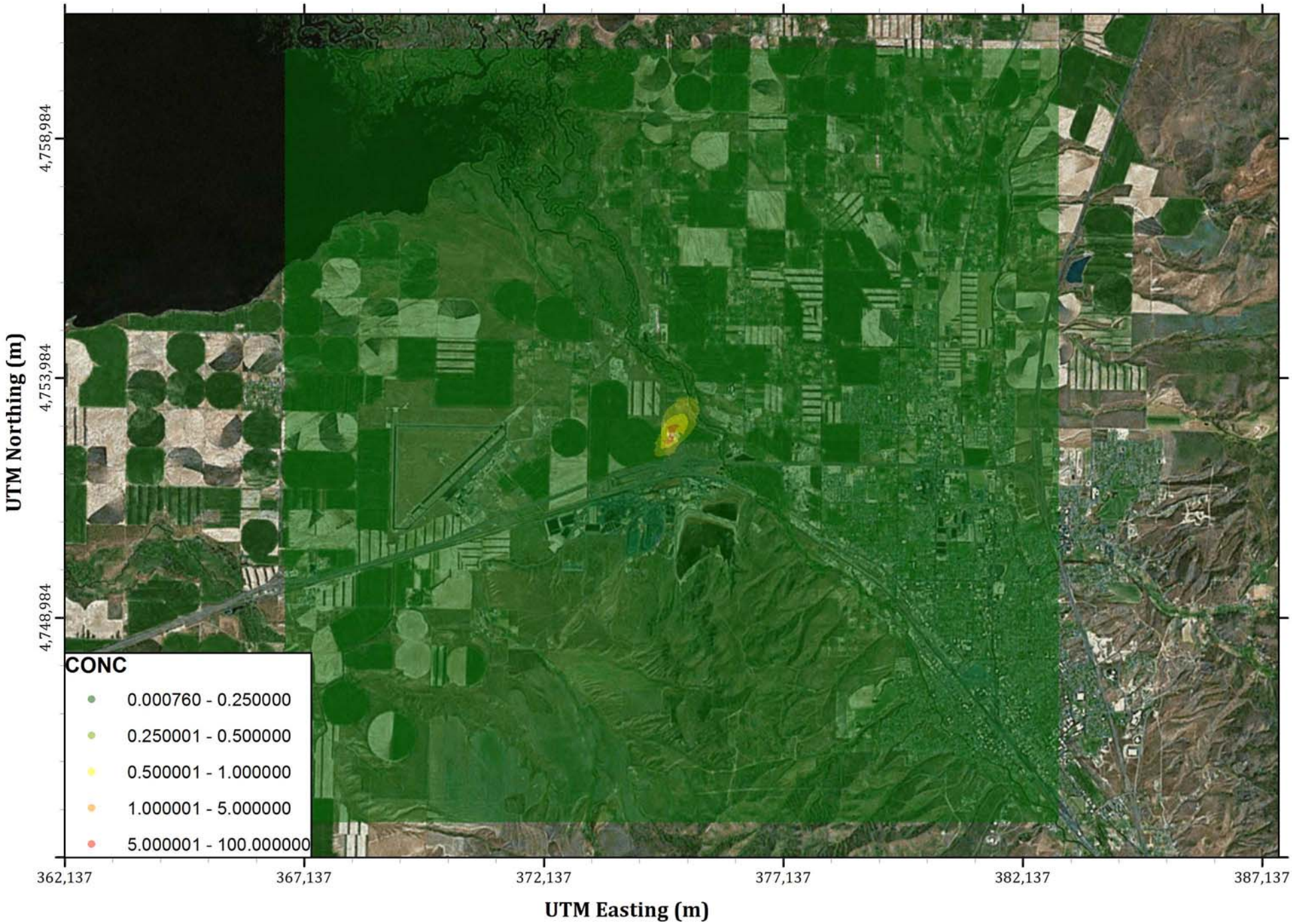
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure I-5 - NO_2 1-Hour Averaging Period Cumulative Impacts for NAAQS Comparison 2008-2012 Meteorological Years



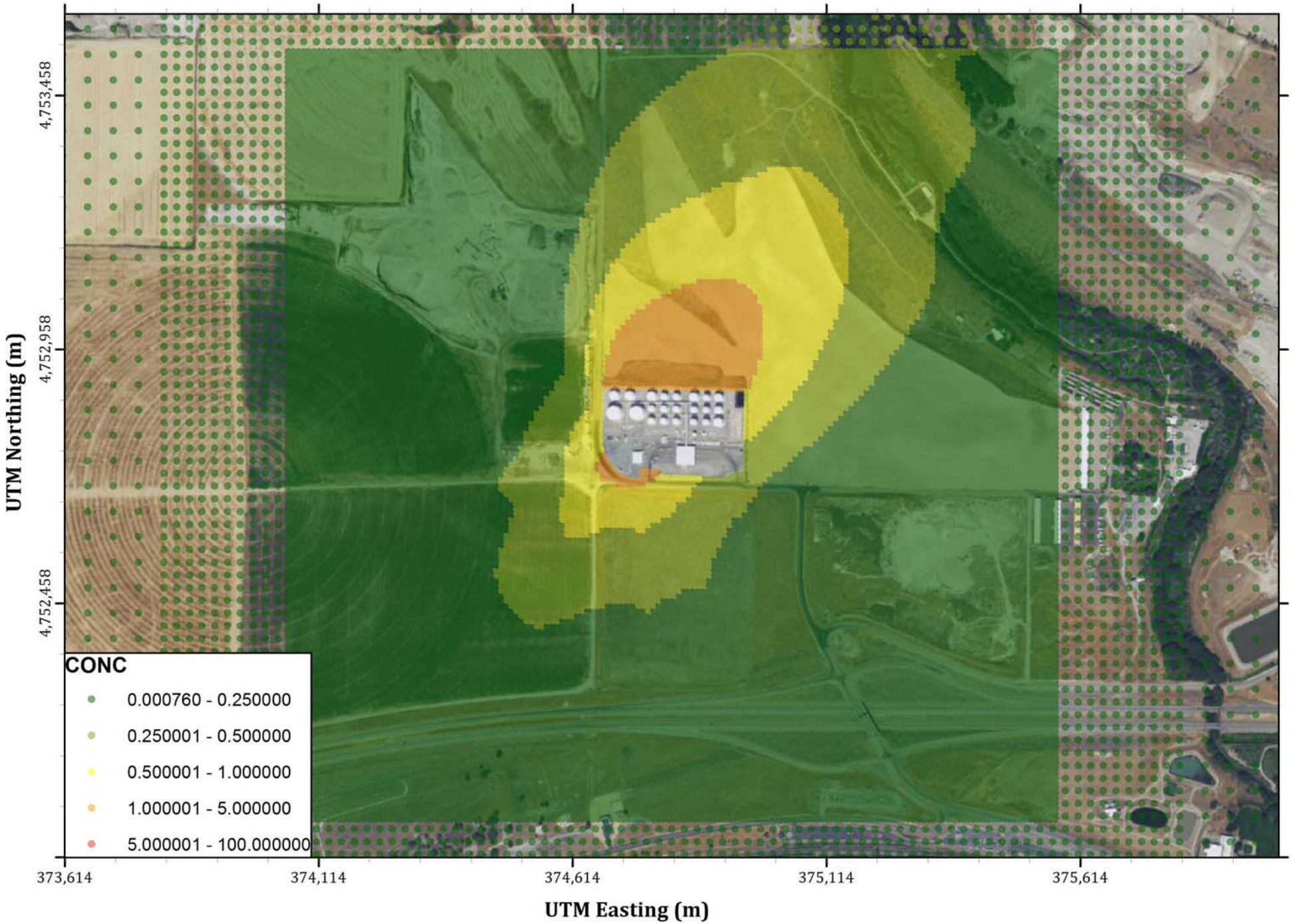
All Coordinates shown in UTM Coordinates, Zone 12N, NAD 83 Datum

Figure I-6 - NO_2 Annual Averaging Period
2012 Meteorological Year



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

Figure I-7 - NO_2 Annual Averaging Period
2012 Meteorological Year



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

Table J-1. NO_2 Annual Average Model Results

Model Year [1]	Modeled Concentration [2] ($\mu g/m^3$, NO ARM)	Calm/Missing?	UTM X [2] (m)	UTM Y [2] (m)	Modeled Concentration [3] ($\mu g/m^3$, ARM)	Background Concentration [4] ($\mu g/m^3$)	Model + Bkgd [5] ($\mu g/m^3$)	Modeling Threshold [4] ($\mu g/m^3$)	Passes Threshold?
2008	3.53	--	374,807.00	4,752,883.30	2.65	7.33	9.98	100.00	YES
2009	2.97	--	374,807.00	4,752,883.30	2.23	7.33	9.56	100.00	YES
2010	3.17	--	374,807.00	4,752,883.30	2.38	7.33	9.71	100.00	YES
2011	3.57	--	374,797.00	4,752,883.50	2.68	7.33	10.01	100.00	YES
2012	3.57	--	374,797.00	4,752,883.50	2.68	7.33	10.01	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 NO_2.

4 NO_2 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 $\mu g/m^3$
Annual Background	3.9 ppb	=	7.33 $\mu g/m^3$

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 J-2. NO_2 1-Hour Model Results

Source Group	High Value	Modeled Concentration [1] ($\mu g/m^3$, NO ARM)	Calm/Missing?	UTM X [1] (m)	UTM Y [1] (m)	Modeled Concentration [2] ($\mu g/m^3$, ARM)	Background Concentration [3] ($\mu g/m^3$)	Model + Bkgd [4] ($\mu g/m^3$)	SIL ($\mu g/m^3$)	NAAQS ($\mu g/m^3$)[3]	Passes Threshold?
ALL	H1H	65.08	--	374,668.20	4,752,763.90	52.06	--	--	7.52	--	No--See Below
ALL	H8H	40.73	--	374,717.00	4,752,885.00	32.59	33.84	66.43	--	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 NO_2.

[3] NO_2 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 $\mu g/m^3$

1-Hour Background 33.84 $\mu g/m^3$

[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 J-3. Benzene Annual Average Model Results

Model Year[1]	Modeled Concentration [2] ($\mu g/m^3$)	Calm/Missing?	UTM X (m)	UTM Y (m)	AAC [3] ($\mu g/m^3$)	Passes Threshold?
2008	2.33E-03	--	374,822.60	4,752,702.80	1.20E-01	YES
2009	2.69E-03	--	374,822.60	4,752,702.80	1.20E-01	YES
2010	3.04E-03	--	374,822.60	4,752,702.80	1.20E-01	YES
2011	2.29E-03	--	374,822.60	4,752,702.80	1.20E-01	YES
2012	2.05E-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. Surfacte 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 J-4. Naphthalene Annual Average Model Results

Model Year[1]	Modeled Concentration [2] (μg/m^3)	Calm/Missing?	UTM X (m)	UTM Y (m)	AAC [3] (μg/m^3)	Passes Threshold?
2008	2.50E-04	--	374,814.50	4,752,703.00	1.40E-02	YES
2009	2.90E-04	--	374,814.50	4,752,703.00	1.40E-02	YES
2010	3.40E-04	--	374,822.60	4,752,702.80	1.40E-02	YES
2011	2.50E-04	--	374,814.50	4,752,703.00	1.40E-02	YES
2012	2.20E-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. Surfacte 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 Cheryl Robinson, IDEQ, on August 28, 2014.

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.